An Evaluation of the CEO Horizon, 1998-2008,

Edgewood Tuition Voucher Program*

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Executive Summary

The CEO Foundation funded tuition vouchers for Edgewood school district residents from 1998 to 2008. All applicants that met the district residency requirement got vouchers through the sixth year, 2003-04. To stay within the $52.4 million budget, the 2004-05 to 2007-08 voucher funding had to be confined to continuing voucher users.

Conservative estimates based on two sets of 'control' districts found that the voucher program had significant positive impacts on single- and multi-family housing numbers and market value, commercial development, EISD test scores, EISD graduation rates, EISD school performance, and on the graduation and college attendance rates of voucher users. EISD academic performance and enrollment peaked during the EVP's early years when growth in voucher use was the most rapid. Indeed, in all but two of the last eight years of the EVP, voucher use and EISD enrollment moved in the same direction. That counter-intuitive result suggests that 'school choice' is a direct and indirect growth magnet, and that loss of choice fosters exodus. No negative impacts were found.

An estimated $6500 EVP-caused rise in the value of an average EISD single family dwelling, alone, netted EISD an extra $10.6 million in additional local property tax revenue. Accelerated EISD graduation rate increase relative to control districts netted the EISD at least an additional $4.7 million in state per pupil payments.

Consistent with the throttling back of the EVP after 2003-2004, and the temporary nature of the program, most of the effects were stronger earlier in the program.

The selective student recruiting claim persists among EVP critics despite long-standing general, and EISD-specific, data directly refuting that claim. This study provides additional strong indirect refutation. The EISD's rapid rates of academic improvement from 1998-99 to 2003-2004 would not have been possible if it had lost its best and brightest students to private schools. The EISD findings and general data from numerous other studies are consistent with the theory that says parents seek vouchers for struggling students.

The effects of the EVP add to our understanding of school choice programs that level the playing field mostly among the existing choices. The key characteristics of the EVP place it between the narrowly targeted and restriction-laden programs that have been widely studied, and the large, unrestricted programs that are still largely untested. Universality and lack of price control probably caused the EVP effects to be generally stronger than the effects of targeted programs, and the EVP yielded significant economic development effects that were absent, or unnoticed, for the more restriction-laden programs.

Probably the biggest news out of this report for general consumption is the strong economic development effect of a universal school choice program. States, cities, counties, or school districts can use a no-price-control, universal voucher program to attract families and businesses at no net fiscal cost - probably some savings - and also improve their school system.

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Introduction and Overview

In April, 1998 CEO[1] Foundation official Robert Aguirre announced the availability of "CEO Horizon Scholarships" to Edgewood Independent School District (EISD) residents.[2] Since scholarship eligibility did not require proof of superior academic ability, 'scholarship' and 'tuition voucher' are equivalent characterizations of the CEO Horizon program. Indeed, the term 'Edgewood Voucher Program' (EVP) is as common as the official name of the program.

The Walton Family and Covenant Foundations committed $52.4 million to the CEO Foundation mission of facilitating expanded school choice for ten years. CEO aimed to change lives and demonstrate that a universal leveling of the playing field between public and private sector schooling options would improve the entire system. They hoped that would help launch a political movement to permanently expand the choices available in every school district.

Previously confined by their limited means to an assigned Edgewood district (EISD) public school, the EVP expanded Edgewood residents' school choices to include to any public or private school that would accept the voucher as full or partial payment of tuition. Only the San Antonio area's wealthiest district, the Alamo Heights District, agreed to accept vouchers. But the distance from EISD to Alamo Heights precluded much interest in that option. Only one voucher

user enrolled there. Many families chose schools with tuition levels above the voucher amount, which meant they had to finance a tuition co-payment out of pocket or through scholarship funding from other sources. That so many low income families were willing and able to do so is itself a significant finding of the research underlying this report.

At first the EVP had a means test in addition to an Edgewood district residency requirement, but with the district's nearly universal 'low income' status, CEO quickly abandoned the means test, and the program became a truly universal, "option-demand voucher program" (Merrifield, 2008a, p 14) through the 2003-04 school year (year 6). 'Option-demand' means that Edgewood school-age children did not automatically get a voucher. All were eligible, but Edgewood families had to choose to choose. The EVP represents a unique programmatic middle ground between the much more narrowly targeted, often restriction-laden, well-known, publicly-funded US voucher programs (Merrifield, 2001), and an untargeted, Friedman-style (1955 and 1962) "pure universal voucher program" (Merrifield, 2008a, p 13) where all families must choose.

Table 1 describes the time pattern of voucher use.[3] Voucher use rose steadily through

Table 1 Pattern of Voucher Use and Related Statistics

	Vouchers	Annual Growth	Private Students	EISD Enroll	Annual Growth	Voucher Share
1998-99	770		50	13323		5.8%
1999-00	888	15.3%	59	12982	-2.6%	6.8%
2000-01	1137	28.0%	111	12983	0.0%	8.8%
2001-02	1713	50.7%	131	13435	3.5%	12.8%
2002-03	1916	11.9%	154	13153	-2.1%	14.6%
2003-04	2042	6.6%	147	12873	-2.1%	15.9%
2004-05	1722	-15.7%	117	12571	-2.3%	13.7%
2005-06	1456	-15.4%	98	12060	-4.1%	12.1%
2006-07	1254	-13.9%	77	11906	-1.3%	10.5%
2007-08	1018	-18.8%	53	11735	-1.4%	8.7%
2008-09	0	-100%	0	11644	-0.8%	0

2000-01 when it stood at 8.8 percent of EISD enrollment. The reader should be careful not to interpret the percentage shares literally. Many voucher users would not have otherwise attended EISD schools. It's not just that some voucher users had been attending private schools without a

voucher. Voucher use minus 'private students' (children enrolled in private school prior to being voucher users) exceeds EISD enrollment loss. As the forthcoming community effects and private school effects discussions will make clear, many voucher users attended non-EISD public schools prior to being voucher users. They moved to EISD – or pretended to - to become voucher users. The exact count is unknown. McGroarty (2001) estimated it at eleven percent, while a Harvard (Peterson et al, 1999) study cited by McGroarty estimated new resident voucher use at 14.9 percent. Others would have left EISD had the EVP not existed, including many children entering school for the first time. So, the shares shown in the last column of Table 1 are there to put voucher use in perspective. They provide an indication of relative size.

With that statistical caveat in mind, note the big 2001-2002 jump in voucher use to 12.8 percent of EISD enrollment. And note that while voucher use increased from 888 in 1999-00 to 1713 in 2001-02, EISD enrollment increased 453 students; a 3.5 percent increase (the first in many years); perhaps an indication that new resident voucher use may have risen far above the McGroarty (2001) and Harvard estimates based on the early years of the Edgewood Voucher Program (EVP). The EISD enrollment increase followed a surge in EISD test score gains that peaked two years before in 1999-00. The EISD section of this report will give that much more attention. After the 2000 to 2002 surge in EVP participation, voucher use resumed its steady increase, reaching a 2003-04 peak of 2042 vouchers; equal to 15.9 percent of EISD enrollment. After 2003-04, budget limitations forced CEO to mostly restrict voucher use to continuing students so that, with attrition and graduations, voucher use declined steadily through 2007-08, the last year of the EVP when vouchers represented 8.7 percent of EISD enrollment.

The aim of this latest in a series of studies of EVP effects is to assess possible impacts omitted from the previous assessments, while also summarizing significant previous findings, and extending and re-examining some of them. For example, this assessment will include economic

development and property value effects, including indirect effects on EISD finances. And this assessment re-visits the student achievement and parental satisfaction findings of several previous EVP studies, while also initiating a 'changed lives' assessment that will continue in future reports already budgeted through 2011.

This report begins with a discussion of community effects such as the property tax base impacts, business formation, housing growth, and housing values. Then the discussion moves to academic performance effects, including changes in the performance of Edgewood Independent School District (EISD) schools, impacts on voucher users, and impacts on non-voucher private school users. This report concludes by integrating the EVP findings with the general academic literature on school choice and voucher program impacts.

Community Effects

Property Value

Over the ten year period of the Edgewood Voucher Program (EVP: Fall, 1998 to Spring, 2008) the total value of the property on the tax rolls within the boundaries of the EISD rose by 86.4 percent. That calculation, and many more that follow, came from data in a County Appraisal District annual property value report to the state.[4]

Local inflation rates probably vary significantly within the U.S., so rather than making a national inflation index-based data adjustments that could skew comparisons we compared the EISD's property value growth to change in the Merrifield (2004)[5] and MGT Study (1999) control districts. So, we assume that after the 1997-98 school year, the EVP is responsible for significant differences between EISD and its control districts, with some exceptions, as noted.

The Merrifield (2004) control districts – all in Texas - are Crystal City, Port Arthur, Waco, Wilmer-Hutchins, Robstown, and West Oso. The variables that were the basis of the control

district selections are the level and rate of change of the percent white, mean composite ACT (American College Test) test score, percent passing the TAAS test (Texas Assessment of Academic Skills), percent economically disadvantaged, student/teacher ratio, taxable value per pupil, state aid per pupil, total revenue per pupil, and total operating expenditure per pupil.[6] The MGT control districts were Harlandale (in near-SW San Antonio), San Antonio, South San Antonio, Pharr, Weslaco, and Laredo. MGT (1999) did not explain how they selected their control districts. To demonstrate the robustness of our findings and to deflect potential criticism that we engineered our findings through control district selection, we derived our results whenever possible for both sets of districts.

That comparison of pre-1998 similar districts should control for any factors common to EISD and the control districts, including inflationary pressures. Two of the Merrifield (2004) districts were excluded from our assessment of community effects. The Wilmer-Hutchins District ceased to exist after 2005, and the development of an industrial park in the rural Crystal City District arguably negates its ability to serve as a benchmark for community effects of an urban district like Edgewood. Community effects were not part of the Merrifield (2004) study, so the then less significant Crystal City industrial park was not taken into account then, and in that study the rural nature of Crystal City was offset as a negative consideration for its selection as a control district by Crystal City's location off the Mexico border, and its unexcelled match of EISD's demographic (i.e. heavily low income Hispanic) characteristics.

The MGT Study (1999) control districts include three Bexar County neighbors of EISD, which renders them less reliable as voucher-treatment-free benchmarks for EVP effects. One of the three included downtown San Antonio, which may be similar to EISD in terms of student characteristics but is very different in terms of economic composition. The main specific reason for those districts' questionable reliability as control districts to assess EISD changes is not the

potential for the EVP to influence neighboring districts – though that was a possibility for school policies – but the announcement and subsequent construction of a Toyota Tundra truck factory just south of EISD's southern neighbor districts. Supposedly, the announcement effect on economic development was much larger than even the substantial effects of the actual factory and its suppliers. The other three MGT districts are along the U.S.-Mexico border which creates other EISD 'community effects' comparison complications.

So, the meaning of the ten year, 86.4 percent rise in the total value of property on the EISD tax rolls largely depends on differences between EISD and the other four Merrifield (2004) control districts, Port Arthur, Robstown, Waco, and West Oso. Robstown and West Oso are in the inland part of Corpus Christi. We said 'largely depends' because we will still make several comparisons between EISD and some of the MGT districts. Over the full ten-year period of the EVP, EISD's 86.4 percent property value gain ranked 3rd among the five districts (EISD plus the four districts named above). So, EISD's impressive 86.4 percent gain from 1998 to 2008 was not unusual for the districts that were deemed comparable to EISD prior to the 1998-99 school year.

Since a temporary program might have short-lived and varying effects, we also looked at changes over less than the full ten year period of the EVP. The results for 1998-2001 and 1998-2005 also have the advantage of being mostly pre-Toyota, which was not a factor in EISD, but certainly was for the three San Antonio-area districts just north of the Toyota factory. As will become apparent as this report on EVP effects unfolds, it was quite common for relative EISD gains to peak early or mid-EVP, and then fade some with the end of universality in 2004 and the approach of EVP expiration in 2008. Property value change is the first example of that time pattern. EISD's 1998-2001 property value gain of 16.2 percent was second among the five districts – better than the 1998-2008 performance - and EISD's 1998-2005 gain of 54.6 percent was the highest; only slightly higher than Waco for 1998-2005, but much higher than the rate for

the other three Merrifield (2004) control districts. EISD test score improvement peaked in 1999-00 (discussed later), and voucher use peaked in 2003-04. Property value growth, especially assessed value growth, should slightly lag those growth magnets, and it does.

Housing Growth

The number of single family dwellings in EISD grew by 2.1, 4.9, and 7.4 percent from 1998-2001, 1998-2005, and 1998-2008, respectively; second fastest among the five districts in all three periods; comparable to the two Corpus Christi districts, Robstown and West Oso; much faster than Port Arthur and Waco. Relative to the MGT districts, EISD growth out-performed the San Antonio district (SAISD), but not the South San Antonio district which ends just north of where the Toyota factory is. The story is similar, though slightly less impressive for EISD, for the aggregate market value of single family residential property. A regression analysis of single family value property values follows in a few pages.

EISD's multi-family residential properties grew 1.5, 17.1, and 25.1 percent from 1998-2001, 1998-2005, and 1998-2008, respectively. Those rates were in the middle of the five districts' performance, which is quite remarkable given the closure of some EISD apartment projects in the late 1990s. EISD steadily improved its standing in multi-family market value relative to the control districts. EISD's whopping 209.1 percent gain in market value from 1998-2008 was tops, and the 1998-2005 rate of 79.6 percent was second only to Robstown.

EISD's growth in mobile home use and mobile home market value topped the four control districts in all three periods, by far. The absolute numbers are small, but an initial surge in mobile home market value and lagged growth in the number of mobile home properties is consistent with the incentive to quickly and cheaply respond to the EVP, and from families' perspective in 1998 and 1999, the possibly temporary nature of that opportunity. Mobile home market value jumped 65.9 percent from 2000 to 2001, and another 96.3 percent from 2001 to 2002, whereupon it

leveled off and then declined slightly. The number of mobile home properties responded to the increase in market value with a one-year lag.

The Lago Vista Village apartments built in 1998 lured tenants with banners touting access to the CEO-funded tuition vouchers, and a marketing brochure stated: "If you rent here, your child will get a scholarship to go to any school you choose." A San Antonio Alternative Housing Corporation board member verified that residents of a planned 65-unit single family housing development, Villas de San Antonio, would be voucher eligible. Both were the first major EISD housing projects in forty years. Consistent with the aggregate data presented above, both properties quickly filled and sold out, respectively.

Closer Look at Single Family Properties – Much Closer

The practice of discerning impacts through comparison to pre-'treatment' (EVP in this case) similar places has its limitations, both in terms of the nature of the comparisons and doubt about the reliability of the benchmark for precisely measuring effects and linking them to the treatment. Multiple-variable regression analysis – econometrics in economics lingo – is another way to identify probable cause-effect relationships. Technical Appendix A describes the econometric procedures used to assess the EVP's effects on single family property values.

So, to test the general conclusion of some positive impact derived from the comparisons of the aggregate data cited above and to seek a measurement of the size of a key impact, the EVP research team gathered single family home data from the property tax rolls (BCAD - Bexar County Appraisal District) and the Multiple Listing Service (MLS – Real Estate Sales) for EISD and three neighboring districts, and gathered data for 'control' variables from a variety of sources including, especially, the annual 'Snapshot' report of the Texas Education Agency.

There is a substantial literature documenting the property value effects of perceived differences in public schools and public school districts (see Clapp et al, 2008; Downes and

Zabel, 2002; Haurin and Brasington, 1996; Jud and Watts, 1981). However, the large body of literature connecting variability in school attributes to variability in residential property values contains few studies that assess the effects of geographically-targeted changes in school policies. Maria Ferreyra (2007; p 807) found that vouchers raise property values "in the locations favored by voucher users." The availability of vouchers eliminates trade-offs with other desired location issues. Clive Belfield (2006) and Randall Reback (2005) show that, "open enrollment programs (of which vouchers are one example) change local property values" by weakening "the public schools' local monopoly (Belfield, 2006; p 6)." Reback's analysis of Minnesota data indicated that housing in the neighborhoods of the better schools lost value, and gained value in the neighborhoods of the least desirable schools.

Like the EVP, a school desegregation order targets specific parts of a metropolitan area. Gill (1983) found that expected school desegregation raises suburban property values relative to properties in areas that re-draw boundaries and implement busing, especially properties most suitable for households with a large number of school age children. Clotfelter's (1975) study of an active desegregation plan reached the same conclusion. He reported controversial findings that homes near schools that raised their share of non-white students lost value. Jud and Watts (1981) found that race effects had been over-estimated in previous studies, including Clotfelter (1975).

Clearly then, schooling issues are a key factor in residential location choices, and thus potential major determinants of property values. So it follows that the universal-within-EISD voucher program could impact the property values of the targeted area. The direct aim of the econometric analysis was to test the null hypothesis that EISD resident access to a temporary, universal, large voucher did not change the value of EISD single family homes. A secondary aim is to direct scholarly attention to the property value effects of tuition vouchers, especially to the

importance of differences in voucher policies for property value effects, which has been a basis for opposition to voucher programs (Brunner and Sonstelie, 2003; Nechyba, 2003).

Availability of subsidized private schooling in Edgewood makes leaving the district less attractive to families that prefer private schooling, and it makes relocating to the district more attractive to such families. On that basis, the alternative to the null hypothesis is that the EVP measurably raised single family residential property values in the EISD. A significant negative effect on property values is plausible only if the voucher program makes the Edgewood district a less desirable place to live, for example, through negative effects on EISD schools through budget cuts. Dolores Munoz, the EISD superintendent when the voucher program began, said[7] that EISD's high fixed costs, and EISD's high rate of dependence on state funding[8] would cause the state funding loss with the departure of each student to exceed the savings from no longer having to educate them. Therefore, she said that EISD schools would suffer from the budget cuts that the voucher program would force. Subsequent data demonstrated that there was little basis for budget cuts. Total dollars and dollars per pupil, allowing for inflation, were up significantly from 1998-2008, though there was some decline from 2000 to 2002 with the '9/11' recession, and because state funding increases lag enrollment growth by a year. From 2000 to 2002, per pupil revenue was virtually flat in nominal terms, suggesting an approximate six percent cut in real terms. Performance, as measured by the Texas Assessment of Academic Skills (TAAS) test, rose sharply from 1998-2000, and then held steady through 2002 (more on this later). But even if there had been a basis for negative feedback effects on property values, they would occur with a considerable lag. So, at least the initial EVP's property value effects, if any, should definitely be positive, and a one-tail t-test of statistical significance for the VOUCHER coefficient is in order.

The novelty of the Edgewood Voucher Program (EVP) and optional participation are plausible grounds for learning curve and discovery lags and gaps. Despite much hoopla,

publicity, and controversy, numerous Edgewood families were not immediately aware of the program, and others mistakenly assumed from the official name of the program - "Horizon Scholarship Program" – that superior academic ability had to be demonstrated to qualify for a voucher. Despite ample anecdotal evidence of 'voucher user' in-migration, and some front-page newspaper coverage, two top sellers of Edgewood properties were not aware that there had been a voucher program during the past ten years, or even what a tuition voucher program was. Because the MLS data reflected actual sales, and the BCAD data had observations with price estimates based on sales of comparable properties, often lagging market value changes by a year or two (re-appraisal lag), MLS was the preferred type of data. But MLS data are only available for the preceding five years. It's still a mystery what happens to MLS data older than five years. We expended a lot of effort to find the older data, but our efforts were futile. So, since we began our MLS data quest in 2007, data prior to 2002 simply were not available. The final MLS data set covered the years, 2002-2008. BCAD data were available from 1998 to 2008. Table 2, below,[9] displays the mean and standard deviation for each variable in the two data sets. We collected data for EISD and the adjacent districts, Northside, San Antonio, and South San Antonio.

The time pattern of the EVP's property value effects is a major issue, especially for the dummy variable (=1 for voucher available, =0 for unavailable) approach to this type of situation. We also tested our model with the number of vouchers as the key independent variable, though clearly this approach has at least the drawback that 'zero' observations dominate the data set. Furthermore, the lag between property supply and demand effects and the voucher count are unknown. We found that the number of vouchers was not a significant determinant of property values within the range of the data available, and so we did not report those results.

For our dummy variable approach, VOUCHER = 1 for the EISD observations for 1999-2003 or 2004, VOUCHER = 0.5 for 2004 or 2005 to 2006 or 2007. VOUCHER = 0 for all non-

Table 2A: Descriptive Statistics - 1998-2008 Appraised Values for Property Taxes

	N	Mean	Std	Min	Max
ln(Price)	370656	10.72608	0.518822	7.783224	14.83956
#BR	370656	2.648585	0.704804	1.000000	16.00000
#FB/HB	370656	1.263384	0.483080	0.000000	10.00000
#Gar	370656	0.243810	0.497281	0.000000	6.000000
ln(SqFt)	370656	6.995276	0.364053	4.700480	9.580109
LotSz-Acre	370656	0.196117	0.705778	0.000700	139.4400
Voucher	44	0.250000	0.438018	0.000000	1.000000
ln(Spd/pupil)	44	8.264622	0.131360	8.008698	8.474703
%TASSTAKS	44	64.73863	12.01317	44.00000	85.90000
%MathTASSTAKS	44	4.13863	11.32868	55.00000	93.20000
ACT	44	17.83409	1.917234	15.30000	21.30000
%Drop	44	1.297727	1.061698	0.000000	4.500000
ln(MedInc)	44	10.39656	0.253085	10.04886	10.89537
%Disadvantged	44	79.62272	20.73203	41.00000	96.50000
%Tested	44	59.89318	6.993132	42.80000	72.50000
ln(PropVal/Pup)	44	11.50591	0.653708	10.34251	12.67159

Table 2B: Descriptive Statistics - 2001-2008 Sales Values from the Multiple Listing Service

	N	Mean	Std	Min	Max
ln(Price)	34868	11.630000	0.628811	4.442651	14.89731
#BR	34868	3.222783	0.700994	1.000000	10.00000
#FB/HB	34868	2.091258	0.715355	0.000000	10.50000
#Gar	34868	1.485975	0.856801	0.000000	9.00000
ln(SqFt)	34868	7.425162	0.405222	0.693147	10.66312
LotSz-Acre	34868	0.231197	0.504266	0.005166	23.00000
Voucher	28	0.250000	0.440958	0.000000	1.00000
ln(Spdng/pup)	28	8.333077	0.102758	8.087025	8.474703
%TASSTAKS	28	60.660710	12.26417	44.00000	85.90000
%MathTASSTAKS	28	70.03214	11.46766	55.00000	93.20000
ACT	28	17.79285	1.946112	15.30000	21.30000
%Drop	28	0.682142	0.554479	0.000000	1.80000
ln(MedInc)	28	10.45108	0.236621	10.18529	10.89537
%Disadvantged	28	80.42857	20.46776	41.70000	96.50000
%Tested	28	59.93214	7.813665	42.80000	72.50000
ln(PropVal/pup)	28	11.64564	0.607979	10.54928	12.67159

EISD observations, and for 1998 and 2008 for EISD, and 2007 for EISD in some regressions. Note that the BCAD data are January 1 values, so that the January 1, 1998 observations represent pre-EVP, which was announced in April, 1998. The rationale for setting VOUCHER at 0.5 for 2004 or 2005 to 2006 or 2007 is that once CEO began limiting voucher access to current users,

which occurred after the 2003-2004 school year, the magnitude of the EVP 'treatment effect' declined. The demand half of an EVP property value effect would vanish after 2003 or 2004. How quickly the data would reflect that would depend upon how fast word spread about the change in CEO policy, and how fast BCAD property re-appraisals would fully reflect it. In other words, after calendar 2003 or 2004, the EVP could no longer prompt increased demand for EISD properties, only reduced supply, as voucher users that might have otherwise left stayed to remain voucher eligible. Some anecdotal evidence from interviews discussed in more detail later suggests that the supply effect was non-trivial.

Except for the uncertainty about the time pattern of the VOUCHER dummy variable, the model is a basic property value hedonic model. Theoretically, the key neighborhood factors are income, quality of public services (Oates, 1969), and the availability of amenities, that in this case include the variable of interest, access to a tuition voucher in Edgewood from the Fall of 1998 to the Spring of 2008. The control variables available to isolate the VOUCHER impact were property attributes like lot size, residence size, number of bedrooms and bathrooms, and neighborhood variables like property value per pupil, public school spending per pupil, percent disadvantaged, and test scores as a proxy for perceived school quality. Because of colinearity issues, the empirical models had to omit some of the theoretically plausible explanatory variables.

The income/wealth measure is the critical control variable. Without an adequate representation of differences in district income/wealth, the estimate of the VOUCHER 'effect' would reflect the generally lower property values in EISD, especially compared to the adjacent Northside District. Given the limitations of annual school district data, that represented a major challenge. We even created school district median income estimates, but we settled on an income/wealth proxy based on the plausibility of the signs (+/-) and size of the coefficients of the control variables. For example, we rejected models wherein the regression coefficient of the

income/wealth proxy did not have the expected positive and significant sign, or where the test score variables had the unanticipated sign. In the remaining models that also included regressions wherein VOUCHER was only zero or one (no 0.5 values), the VOUCHER effect estimates were robust between the MLS and BCAD data sets and across the different specifications in which the income/wealth proxy had a positive and statistically significant coefficient. The range for the regression coefficient of VOUCHER was 0.110 to 0.157; mostly significant in the 88% to 95%+ range. Therefore, we reject our null hypothesis in favor of the alternate hypothesis that the EVP did significantly increase the value of single family properties in the Edgewood district. In the Table below, we omitted the triple asterisk (>99% significance level) that would denote the very high level of statistical significance of the house feature variables. For VOUCHER and the control variables, a single and double asterisk denote 90% and 95%, one-tailed t-tests of statistical significance, respectively. Two BCAD results, and two of the MLS regression results, are below.

The only thing noteworthy about the results for the house characteristic variables is that the number of bedrooms is not a significant variable in the MLS regressions. The likely reason is the colinearity between bedrooms and other house characteristics that was not evident in the BCAD regressions. Differences in Property Value per Pupil between districts are the proxy for the income/wealth effects, and over time differences are the best indicator of inflation. The voucher doesn't influence property value per pupil enough for the whole data set, and not contemporaneously for the MLS data, to strongly argue against its use as an explanatory variable for the price of individual homes. The 'per pupil' part of property value per pupil is also arguably mostly independent of the voucher effect on the number of pupils. As noted in the discussion of Table 1, a very significant number of voucher users had not previously attended an EISD school, and that in more years than not, voucher use and EISD enrollment moved, counter-intuitively, in the same direction. That is, from 2000 to 2002 voucher use rose by 825 while EISD enrollment

Table 3A: Bexar County Appraisal District Data Analyses

	Model #1	Model #2
BR	0.03064	0.03064
	[40.87]	[40.87]
FB_HB	0.08973	0.08973
	[86.81]	[86.81]
Garages	0.09873	0.09873
	[110.78]	[110.78]
ln(Sq Ft)	0.80194	0.80194
	[533.78]	[533.78]
Lot Size	0.02747	0.02747
	[46.06]	[46.06]
VOUCHER	0.14956	0.13642
	[1.99]**	[1.89]**
ln(Prop$$/pupil)	0.94524	0.94747
	[12.97]***	[12.90]***
Math/TASS	0.00194	0.00223
/TAKS	[1.07]	[1.24]

VOUCHER = 1 for Edgewood, 1999-2003,	VOUCHER = 1 for Edgewood, 1999-2004
VOUCHER = 0.5 for Edgewood, 2004-2007,	VOUCHER = 0.5 for Edgewood, 2005-2007
VOUCHER = 0 Otherwise	VOUCHER = 0 Otherwise

y = LN(Total Value - $)
n = 370656 Note: [t-stat]

rose by 435 students. From 2004 to 2008 voucher use fell from 2042 to 1018 (1024 less), while EISD enrollment fell by a nearly identical 1138 students. The school spending per pupil variable also suffers from some endogeneity concerns in that some school district revenue comes from property taxes, though not much in the EISD where state formula funding is the main determinant of funding per pupil. The share of EISD funding from "local and other" (not state or federal) varied from eleven to seventeen percent between 1998 and 2008.

The dependent variable is LnTotalValue, the natural log of the House Price (x, so that e^x = House Price; where, e = 2.7183), so the coefficient of VOUCHER indicates the impact on 'x', the exponent of 'e.' Most calculators have an e^x function you can use to verify these results.

Table 3B: Multiple Listing Service Data Analyses

	Model #3	Model #4
FB_HB	0.1698	0.1698
	[42.35]	[42.35]
Garages	0.1239	0.1239
	[44.20]	[44.20]
ln(Square Feet)	0.7657	0.7657
	[107.42]	[107.42]
Lot Size	0.0875	0.0875
	[26.06]	[26.06]
VOUCHER	0.1570	0.1204
	[1.56]*	[1.26]
ln(spend/pupil)	0.5588	0.4935
	[1.54]*	[1.36]*
ln(Prop$$/pupil)	0.2829	0.2942
	[1.45]*	[1.47]*
	VOUCHER = 1 for Edgewood, 2002-2003,	VOUCHER = 1 for Edgewood, 2002-2004
	VOUCHER = 0.5 for Edgewood, 2004-2006,	VOUCHER = 0.5 for Edgewood, 2005-2006
	VOUCHER = 0 Otherwise	VOUCHER = 0 Otherwise
	y = LN(Total Value - $)	
	n = 34868 Note: [t-stat]	

With VOUCHER = 1, the mean EISD value of LnTotalValue is 10.82206, so that, solving for e^x, the average house value in EISD during the EVP was $50,114. Without EVP (VOUCHER = 0), and the ***largest*** VOUCHER coefficient (0.15700) in Table 3, LnTotalValue is 10.66506 (10.82206 – 0.157), so that, solving for e^x, the average house value in EISD without EVP would be $42,833; a difference of $7281 attributable to the EVP. Without EVP (VOUCHER = 0), and the ***smallest*** statistically significant VOUCHER coefficient in Table 3 (0.13642 – from the seemingly stronger[10] BCAD results), LnTotalValue is 10.68564, so that, solving for e^x, the average house value in EISD without EVP would be $43,723; a difference of $6391 attributable to the EVP. Using the smallest coefficient, the barely below 90% statistically significant 0.12040 coefficient

in Model #4, the EVP effect is an average of $5685 per EISD house. Probably those estimates ($5685 to $7281) bracket the possibilities that could arise from differences of opinion about model specification, at least from within the available data. In round numbers, a $6000 to $7000 range probably brackets the unknowable 'real' EVP effect.

That range is a plausible result in that the average assessed value of EISD residential property rose by $22,779 from 1998-2007 despite some expansion of the district's modest single-family housing stock; the first major expansions in 40 years. That the voucher program could have accounted for about thirty percent of the 1998-2007 net property value growth is reasonable in light of widespread property value growth during that period, and the district's long, pre-1998 history of little property appreciation. In the three school years prior to the onset of the voucher program, the total taxable value of property in the EISD declined 12.2 percent. It is a somewhat conservative estimate to the extent that the February, 2003 announcement of the Toyota Factory impacted property values in the South San Antonio and San Antonio districts that are closer to the plant, and more likely to be impacted by it, than EISD.

So, the EVP created a wealth enhancement for everyone that sold a home and left the EISD during the EVP period, and it created a fiscal windfall for all of the taxing jurisdictions with Edgewood properties on their rolls. Assuming that properties sold at the same rate for 1999-2001 at nearly the same average rate as the 63 sold in EISD in 2002 – our first year of MLS data – approximately 330 EISD leavers during 1999-2003 averaged the full $6000 to $7000 in additional wealth, and consistent with our assumption that the EVP treatment effect fell 50 percent for 2004-2007, an additional 559 EISD leavers enjoyed half the $6000 to $7000 in increased wealth from selling their EISD property during the time of the EVP.

(330 x $6500) + (559 x $3250) = $3,961,750 wealth windfall

Since some EISD property sellers may have moved to another EISD property during the EVP, rounding that calculation down to a $3.8 to $3.9 million wealth windfall is more appropriate than rounding up to $4 million. The impact of the ~$6500 increase in the taxable value of all properties for 1999-2003, and ~$3250 for 2004-2007 on EISD finances is discussed later in the Academic Performance section of this report.

Business Formation

From 1998 to 2001, the number of commercial properties in EISD increased by only four percent, which was still better than two of the four Merrifield (2004) control districts. Recall that one of the Merrifield control districts, Wilmer-Hutchins, ceased to exist after 2005, that the rural Crystal City District developed an industrial park, and that the MGT districts were likely not chosen to be *economically* comparable to EISD. EISD commercial growth accelerated after 2001. The 1998 to 2005 (+33.2%) and 1998 to 2008 (+35.4%), increases in EISD commercial properties topped all of the control districts. Note, again, that the relative growth rates are largest in the earlier years of the EVP. The growth in the market value of EISD commercial property topped the growth rates in the control districts from 1998 to 2001, and from 1998 to 2005, but the 105% 1998 to 2008 growth rate was second to Port Arthur's 153% growth rate. The EISD pattern with especially rapid growth in the market value of commercial property preceding large increases in the number of commercial properties makes sense. It is fundamental to established price theory that changes in the market value of particular property typically precede property use conversions. The market price changes serve to signal property owners to convert properties to the newly more valuable uses.

Those additional properties for commercial and residential use had to come from other uses. Indeed, the number of vacant lots decreased 22.8 percent from 1998 to 2008, and the number of industrial properties fell by 28.6 percent. That decline in the availability of industrial

properties, and the increased demand for EISD land, generally, increased the market value of EISD industrial property by 227.2 percent from 1998 to 2005.

Gang Violence

The final EVP 'community effect' we explored was gang violence. The theory, largely unverified, is that when school choice causes more children to be better engaged in their academic pursuits, there will be less interest in joining a gang. Interviews of key police officers did not support that theory. They said that the kind of child likely to be a voucher user was not likely to be in a gang. Texas' Public Education Information Management System (PEIMS) data on discipline problems, which signal student failure to engage in their academic challenges, also did not show any noteworthy trends during the 2002-2008 time frame of those data.[11] In the 2002-03 school year EISD had the lowest rates, but unavailability of data for earlier years precludes putting the low 2002-03 rates in perspective. By 2007-08, the rates for the various categories of disciplinary issues were comparable for EISD and its MGT control district neighbors, perhaps with some of the EISD rates on the high side relative to its comparable neighbors, so that with the low 2002-03 rates, the EISD had by far the highest 2003 to 2008 growth rates in recorded discipline incidents. That was a time of declining voucher use and falling district enrollment.

Academic Performance

Our investigation included EISD and the private schools attended by most voucher users. As a backdrop to the academic gains assessment, we examined EISD policy changes and fiscal data. A well-connected interviewee said there was considerable concern among EISD insiders and some activists that the EVP would prompt enrollment losses that would reverse the EISD programmatic gains achieved with the equalization of per pupil funding in Texas. It was certainly central to the previously cited, 1998 comments of Superintendent Munoz about feared budgetary

effects. That concern is especially significant in EISD because many members of the community and employees of EISD had central roles in the litigation process that led to the equalization of per pupil funding. Funding had largely been equalized at the time the EVP began, and was certainly a reality by 2003-04 when Jarboe (2005) noted that, "EISD's revenue per pupil was $8,670, compared with the state average of $7,784, and higher even than its wealthier counter-parts: Alamo Heights, in San Antonio, had $8,201, and Highland Park, in Dallas, had $8,638."

Appendix B has descriptive fiscal tables. It has an internet link to EXCEL spreadsheets too long to print. We discuss the highlights here. Among the eleven Merrifield (2004) and MGT (1999) control districts, EISD had the third highest rate of increase in teacher salaries for 1998-2008, achieving the third highest average salary, though the latter figure needs to be interpreted with caution in that the twelve districts could differ significantly in terms of teacher experience. Indeed, EISD ranked second in terms of teachers with at least five years of experience, which would tend to raise the average salary relative to the eleven control districts. The number of students per teacher fell slightly in the early years of the voucher program when the district did not eliminate teachers in concert with enrollment losses, and then rose forty percent from 1999-00 to 2004-05, first because of a brief enrollment surge, and then because of some reductions in the number of teachers. The first half of that rise in students per teacher occurred during 1999-00 to 2000-01 when the EISD was at its performance peak, with three 'exemplary' schools, and nine rated 'recognized.' In 1998, EISD had no 'exemplary' schools, and only three were recognized. EISD has not had an 'exemplary' school since 2001-02, but that major drop-off in school ratings was a statewide event resulting from a changeover from the TAAS test, last administered in 2002, to the TAKS (Texas Assessment of Knowledge and Skills), which was more difficult, and the TAKS passing standards ratcheted upward each year. More on the performance trends after we finish discussing the fiscal and policy issues.

EISD's total revenue per pupil rose 69.8 percent during the ten-year term of the EVP. That growth rate is roughly in the middle of the pack for the eleven control districts both in terms of growth rate and absolute level ($9884) in 2008. Again, a focus on the early EVP years yields a different picture than the full ten-year period. For 1998 to 2004, EISD and the control districts have very similar growth rates for revenue and revenue per pupil. The EISD revenue per pupil growth rate tops the rate for all but one of the Merrifield (2004) control districts (still, minus Crystal City). A comparison of the changes in voucher use to EISD enrollment changes (see Table 1) reveals continuing ingrained problems with the district. After suffering net enrollment losses in 1998-99 and 1999-00, only partly due to the EVP, EISD gained students (+3.5%) from 1999-00 to 2001-02. EISD performance peaked in 1999-00 and then stayed there for three years. That 3.5 percent enrollment jump happened despite a much larger numerical change in the number of vouchers in use. Indeed, there was a near 100 percent jump in voucher use at the same time EISD enrollment rose 3.5 percent. Clearly, as already documented by property value, mobile home, and business formation data, families were moving to Edgewood. A 1998 EISD policy change allowing EISD employees to enroll their children in the EISD school where they worked may have been a significant factor. According to two EISD teachers, that policy change "galvanized teachers." During that time, ten to fifteen percent of new EISD students were children of employees. But the initial jolt that yielded the 1999-00 performance peak - coinciding perfectly with the announcement of the EVP - wore off and despite declining voucher use after 2003-04, and the expiration of the EVP in 2008, EISD enrollment continued to fall.

What produced the jolt? The EISD board meeting minutes during the ten years that the EVP was in effect did not contain any board member mentions of the EVP.[12] Some citizen testimony mentioned it in passing. However, the EISD teachers we spoke with noted the significance of media attention and increased pressure from parents. Discussions with those

teachers, a former teacher, and former officials revealed a sense that EISD had to become more competitive. And singling out EISD for a voucher program was not seen as random, but "personal." The EVP was seen as a plot to expose dysfunction in the school district that led the fight for public funding equity. District leaders undertook several significant actions in 1998 and 1999, though they did not credit the EVP with prompting anything positive. In addition to the new policy that gave EISD employees permission to enroll their children in their schools, they commissioned the MGT (1999) study, and EISD opened its schools to children from outside the district. An official we spoke with said that the EISD Board largely ignored the MGT study's findings ("political suicide"), but at a board meeting set up to address the MGT report findings, several EISD administrators testified that they had already implemented some of MGT's recommendations, and perhaps others did without saying so. Attention to some of the problems detailed in the MGT study may have contributed to the EISD performance peak the next year. The timing of the MGT study indicates that the EVP may have been partly responsible for it, and or responsible for increased EISD administrator interest in the study's recommendations. Based on our interviews, we believe at least the later is likely.

The district claimed 'selective recruiting' of EISD students, known as 'creaming' in the academic literature on tuition vouchers. That's a common claim of school choice opponents, though it has yet to be substantiated anywhere beyond some anecdotes. And whenever the effort was made to carefully compare choosers and non-choosers, the creaming claim has been refuted. We address this claim in the EVP context later in this report. The credibility of the claim, backed by some alleged examples, plus fear of funding cuts, was enough to organize four busloads of protestors to testify before the legislature.

When the EVP program expired in the Spring of 2008, all but the graduating segment of the 1018 voucher users during the 2007-08 school year had to find new schools, or new sources of

support to stay where they were. Despite some enrollment of former voucher users in EISD schools in 2008-09, EISD's 2008-09 enrollment of 11644 was 91 children below the level during 2007-08 final year of the EVP. Though increased property values over the EVP term raised the local share of EISD's revenue from twelve to seventeen percent, EISD is still especially heavily dependent on state per pupil funding. So, despite EISD property value per student growth (142 percent for 1998-2008) that was better than the rate for every control district, the loss of the state per pupil funding reduced EISD revenue growth and revenue per pupil growth slightly below the level that was normal for the control districts.

In the last of a series of phone calls that netted the then still unpublished EISD 2008-09 enrollment figure of 11,644, an EISD administrator explained the failure of the EVP expiration to cause an EISD enrollment increase with, "families continue to leave the district." He did not cite charter school start-up, though certainly, the 2008 El Sendero conversion to a charter school was a factor. Except for that charter located north of EISD, recent San Antonio-area charter start-ups were small and some distance from the EISD. That EISD administrator asked for more time to provide details; he had a report deadline to meet. We suggested June 30, and he agreed that would allow plenty of time to supply information about the 2008-09 EISD students that had been voucher users. But that phone call was my last successful attempt to discuss EVP-EISD connections with current EISD officials. Repeated phone messages were ignored, and then the number stopped working. Another official ignored my message. A previous attempt to contact a different official – the first one we contacted – had been very pleasant and rewarding, but given the non-cooperation I saw thereafter, that EISD official will remain anonymous so that we don't get him in trouble for taking the transparency and accountability part of public service seriously. We had better luck with former EISD officials.

Economic theory predicts that kind of behavior from government-sanctioned monopolies. They have no incentive to cooperate. Certainly, that recent behavior of EISD officials is consistent with the 2001 EISD formal declaration that they would not co-operate with a Mathematica study (Greene and Hall, 2001). An EISD employee defiantly omitted what were probably key pages from our Open Records request for EISD Board Minutes. They supplied ten years worth of Board Minutes, minus four pages from the first EISD Board meeting after the April, 1998 announcement of the EVP. The EISD opposition to externally-initiated study is also consistent with general school district folklore. Many of the people that deplore the lack of political accountability of schools that enroll voucher users work in school districts or actively support school district governance that has a very poor accountability record. One of us (JM) happened to be in Utah during the 2008 voucher initiative campaign, and overheard complaints about the difficulty getting information from school districts. Buckley and Schneider (2007) noted the same problem in Washington, DC: "Despite the fact that data we were seeking were (or should have been) readily accessible public information, many D.C. school officials felt they had little reason to cooperate in our effort" (pp. 98-99).

The EVP probably yielded some significant net fiscal gains for the EISD. The exact amount gained depends upon the unknowable true EISD net loss of students to vouchers and the consequent loss of state per pupil funding versus the potential to reduce costs when enrollments decline. We estimate that the EVP's effect on graduation rates and residential property values at least offset approximately $15 million of the state funding losses. Our conservative $15 million estimate explained below arises from the higher property values identified by our econometric analysis, and from higher graduation rates.

Through 2003-04, the last year for which the tenth grade minimum skills TAAS test was the graduation exit exam (taken in 2002 by 2004 graduates), the EISD graduation rate rose much

faster than in the eleven control districts.[13] The EISD graduation rate rose 38.6 percent from 1998 to 2004. The next highest graduation rate growth rate for 1998 to 2004 was West Oso's 22.2 percent. The 1998-2004 average rate of increase for the eleven control districts was 9.6 percent. The 1998-2007 EISD increase was also better than any control district, but that nine-year period combines the increases seen by all through 2004 with post-TAAS declines seen by all thereafter. So, the EISD net growth in graduation rates for 1998-2007 was 13.9 percent. EISD realized a much higher graduation rate in 2008 with the more difficult TAKS than it did in 1998 with the easier TAAS. Only one control district netted a graduation rate increase between the 1998 TAAS rate, and the 2007 TAKS rate.

Our estimates of the effect of higher graduation rates on EISD enrollment focus on the 1998-2004 numbers. EISD's 2005-2007 change was only slightly better - less decline - than the control group average, and with the EVP nearing expiration, and very few new voucher applications accepted after 2003, the EVP was unlikely to be a significant cause of the modest 2005-2007 graduation rate differences between EISD and the control districts. EISD's 1998-2004 graduation rate increases meant fewer dropouts and thus higher EISD enrollments and greater state per pupil funding. For example, eighty percent of the EISD class of 2004 cohort graduated on time (see Table 4). If the EISD graduation rate had only increased from 1998 to 2004 at the average rate for

Table 4: Extra Graduates and Extra Enrollment for EISD

	Class of 1999	Class of 2000	Class of 2001	Class of 2002	Class of 2003	Class of 2004	Extra EISD Students	State Revenue Per Pupil	Extra Revenue to EISD
1999	9	9	13	26	0	0	58	$5,463	$314,627
2000	0	16	23	47	23	0	109	$5,454	$593,402
2001	0	0	30	63	41	36	170	$5,518	$939,522
2002	0	0	0	75	56	66	197	$5,956	$1,172,087
2003	0	0	0	0	67	91	158	$6,486	$1,024,204
2004	0	0	0	0	0	111	111	$6,249	$693,939
							'99-'04	Total:	$4,737,780

the control districts, the EISD 2004 graduation rate would have been only 63.2 percent. We spread the difference in the decline in the cohort – from 100 percent to 80 percent vs. 100 to 63.2 percent – over the four years the class of 2004 attended their EISD high school, and did the same procedure for 1999 forward for the classes of 1999, 2000, 2001, 2002, and 2003. That yielded the estimates in Table 4. The EVP's property value effects also increased EISD property tax revenue. Table 5 translates the approximately $6500 average increase in the taxable value of EISD single family dwellings from 1999-2003, and half that from 2004-2007, into additional EISD local tax revenue; a nine year-total of $10.55 million. That does not include the additional tax revenue to taxing jurisdictions other than EISD, or the extra EISD revenue derived from the appreciation of commercial and industrial land indicated by the aggregated data cited in our 'Community Effects' section. Unfortunately, those aggregate land value data for commercial and industrial properties did not support the same calculations that the regression analysis made possible for residential properties. Of course the partner to this windfall revenue

Table 5: Increased Property Tax Revenue to EISD

	Local Tax Rate	Estimated Property Val Gain	EISD Single Family Properties	Extra EISD Revenue	State Revenue Per Pupil	Increased Enroll Equiv
1999	1.63	$6,500	14,072	$1,490,928	$5,463	273
2000	1.534	$6,500	14,114	$1,407,307	$5,454	258
2001	1.559	$6,500	14,257	$1,444,733	$5,518	262
2002	1.631	$6,500	14,313	$1,517,393	$5,956	255
2003	1.574	$6,500	14,467	$1,480,119	$6,486	228
2004	1.627	$3,250	14,528	$768,204	$6,249	123
2005	1.735	$3,250	14,649	$826,020	$6,193	133
2006	1.722	$3,250	14,819	$829,345	$6,287	132
2007	1.61	$3,250	14,955	$782,520	$6,637	118
Total				$10,546,570		1782

increase for EISD is increased tax burden to the residents and businesses that temporarily saw additional property value appreciation, and did not sell their properties to cash in on the increased property value while it lasted.

EISD Test Score Analysis

Since the introduction of voucher programs, there have been numerous evaluations of various voucher program participant effects and competitive effects. Participant effects are the effects of using a voucher. Competitive effects are the impacts on students who remain in traditional public schools.

Documentation of voucher program participation effects requires high quality control groups. Some researchers argue the randomness resulting from lotteries provides the best experimental situation. However, lotteries were not part of the EVP. Other researchers have used statistical analysis to compare participants with other non-voucher students. This approach is useful when comparable test score data are available. Unfortunately, the EVP participants took the Stanford 9 achievement tests (a norm referenced test) and EISD students took the TAAS or TAKS (a criterion referenced test). The tests are not comparable and no extant research provides a method for obtaining comparable scores between the two. Therefore, our only measure of participant effects is approximate differences in graduation rates, and college acceptance rates.

We focus primarily on whether the privately funded EVP improved overall EISD performance. We updated the Merrifield (2004) and the Diamond (2007) studies with the same methodology used by those authors. Data limitations precluded the updating of all past studies. In addition to those updates, we used the Merrifield (2004) and the MGT Study (1999) control groups to employ a more complex econometric analysis. Our work econometrically assessed late years of the EVP and re-assessed some of the early year results.

We start with an examination of the existing voucher competitive effects literature and the literature that addresses the methodological concerns discussed in competitive effects studies in general. Then we discuss the data used to update the previous studies and for the new econometric analyses. We describe our econometric methodology before presenting our results, though we relegate highly technical aspects to Technical Appendix B.

Competitive Effects Literature Review

Our focus is on the competitive or systemic effects of the EVP, a *private* voucher program. The extant literature focuses mainly on participant effects of vouchers or competitive effects of charter schools or *publicly* funded voucher programs. Since charter school programs and publicly funded voucher programs differ distinctly from the privately funded program in Edgewood, this literature review analyzes only those studies evaluating the competitive effects of the EVP.

Four studies fit that description. The first study, by Greene and Hall (2001), conducted an EISD case study with a portion of the study addressing the response of EISD schools to the EVP. The authors concluded that the effects on the academic performance of EISD students were "negligible at best" (Greene & Hall, 2001 p. 25). The authors state that after the first year, "there is little evidence that Edgewood made significant changes in broad education practices, such as changes in curriculum or teaching techniques (Greene & Hall, 2001 p. 25)." Depending on the comparison district used, the authors found varying results. Thus, they concluded, "Because the pass rate in school districts with and without a voucher program is similar, we cannot conclude that the gains in Edgewood are related to changes in teaching practices made by individual teachers in response to competition from the private schools" (Greene & Hall, 2001 p. 26). TAAS scores increased in several districts including districts without the threat the vouchers; therefore, the authors did not conclude the vouchers caused the increase in TAAS pass rates.

Greene and Forster (2002) compared predicted district level test scores across the state to actual test score results and ranked each district. That is, they econometrically determined a predicted score for each district in Texas using a variety of demographic variables. Then they compared that predicted score to the actual score for each district: "by ranking all districts in Texas according to how well they outperformed (or how badly they underperformed) their expected gains, we can see whether Edgewood is significantly outperforming its expected gain (or falling short of expected losses) more than most Texas districts" (Greene & Forster, 2002 p. 5). The authors determined that the Edgewood district fell in the 85th percentile suggesting the district's actual gains exceeded their predicted score at a greater rate than did 85% of the Texas districts. Therefore, the authors concluded that, "to the extent that Edgewood outperforms its expected gain, some factor other than changes in population and resources has pushed up its test scores" (Greene & Forster, 2002 p. 5). Although EISD's apparent gains could be by chance or from leadership initiative in EISD not found in the control districts, the authors argue that the voucher program played an important role. Unfortunately, the available data precluded an update of the Greene & Forster (2002) econometric analysis.

Merrifield (2004) took a different quasi-experimental approach. Merrifield evaluated TAAS test scores and a variety of demographic and financial variables from the Edgewood school district along with 6 comparison districts not adjacent to the EISD from 1994 to 2002. The quasi-experimental design tracked the variables in his Table 2 and 3 for the EISD and the six control districts for 8 years. The author concluded that the trends detected in those data reflected similar findings in a previous study: "The quasi-experimental results are consistent with the Greene and Forster (2002) econometric findings. Edgewood appears to be slightly outperforming the average TAAS gains of similar school districts" (Merrifield, 2004 p. 456).

Our Test Score Assessment Procedures

The previous EVP studies evaluated the effect of the voucher program on the EISD in the early years (1999-2002). It is not a coincidence these studies use the 2002-03 school year as a cut-off. The Texas Education Agency changed tests in 2003 and began using the TAKS test rather than the previously employed TAAS test. This change makes a sound comparison from 1994 to 2008 impossible. Although some statistical methods could be employed to adjust for such a change, it would be unknown whether the specification of the model captured all aspects of the change. Therefore, the evaluations of the voucher program have taken on two distinct time periods, before 2003 and after (Diamond, 2007).

To update Merrifield (2004), we collected data for EISD and six control districts as indicated in the article, as well as the six MGT control districts. It is possible to glean from the statistics in Table 6 and Table 7 how closely EISD resembles the control districts. The literature suggests that the demographic variables that have the most influence on test scores are race and socioeconomic status. Typically, the literature reports positive correlations between percent white and test scores and a negative correlation between percent economically disadvantaged and test scores. Overall, the statistics indicate that the EISD is more disadvantaged on average than the control districts. Edgewood has a percent white percentage around 1% while the control districts have an average near 5%. Edgewood also has a higher percentage of economically disadvantaged students on average with 94% compared to control district means around 84%. Those demographic variables indicate that the Edgewood district has a population more difficult to educate, so that any estimate of EISD relative gains are conservative estimates. The data points indicate that the percent passing the TAKS test steadily rose for all districts included in the analysis. Because of the surprisingly low scores for all districts in the first few years, the state reported a number of different scores the first two years in an effort to phase in the new test.

Table 6 and Table 7 report the new scores on the percent passing of the TAKS exam rather than the phased in scores. The Edgewood TAKS scores and the Merrifield (2004) control district mean start at similar points (27.5 and 26.2 respectively). However, the Edgewood TAKS scores appear to grow at a faster rate through 2008 as the passing rate increases to 57.0 percent. The control district mean grew to 51.4 percent.

Table 6

Edgewood District Key Features and Control Group Range for Merrifield (2004) 2003-2008

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Enrollment	13153	12873	12571	12060	11906	11735
Control Districts' Mean	6201	6136	6002	6515	6444	6365
Control Districts' Range	1861-15731	1891-15591	1923-15518	1958-15592	1906-15403	1951-15171
% White	1.1	1.1	1.2	1.0	1.0	0.8
Control Districts' Mean	5.8	5.6	5.3	5.2	4.8	4.3
Control Districts' Range	1.1-17.6	1.0-16.8	0.8-16.2	1.0-15.5	1.1-14.5	0.9-13.6
% Economically Disadvantaged	96.0	94.5	94.3	92.1	96.5	94.5
Control Districts' Mean	80.9	83.9	82.5	86.0	86.8	87.2
Control Districts' Range	63.1-89.8	77.9-91.4	68.4-91.7	79.1-94.2	82.3-93.2	83.1-93.0
% Passing TAKS	27.5	37.0	43.0	52.0	57.0	57.0
Control Districts' Mean	26.2	37.0	39.2	46.4	50.8	51.4
Control Districts' Range	19.2-31.2	32.0-44.0	20.0-48.0	42.0-50.0	47.0-57.0	48.0-56.0
Mean Composite ACT	15.4	15.3	16.8	16.4	16.5	16.2
Control Districts' Mean	16.3	16.7	16.5	16.5	16.9	17.1
Control Districts' Range	14.7-17.8	15.1-17.6	14.7-17.5	16.0-17.1	15.5-17.6	15.8-18.2
Student/Teacher Ratio	16.3	17.1	19.1	15.7	15.6	14.3
Control Districts' Mean	14.8	15.3	14.8	14.5	14.4	14.5
Control Districts' Range	13.9-16.0	14.3-17.1	14.2-15.9	13.8-15.2	13.5-16.5	13.3-16.2
Taxable Value per Pupil	44,734	50,550	54,101	60,709	66,676	75,178
Control Districts' Mean[a]	140.4	145.2	160.3	167.0	193.3	225.6
Control Districts' Range[a]	49.0-236.7	49.1-244.4	57.6-274.8	61.7-312.7	68.2-398.1	77.6-463.4
State Revenue per Pupil	5,956	6,486	6,249	6,193	6,287	6,637
Control Districts' Mean	4,085	4,522	4,492	4,704	4,842	5,160
Control Districts' Range	1940-5724	2337-5995	2356-6669	2253-6598	2292-11614	2496-7173
Total Revenue per Pupil	7,099	8,729	8,664	9,177	9,697	9,884
Control Districts' Mean	6752	8,246	8,534	9,623	10,291	10,593
Control Districts' Range	6061-7119	7304-9294	7290-10421	8408-10562	8617-11614	8854-12397
Total Expenditure per Pupil	7,086	7,845	9,359	11,499	10,950	10,993
Control Districts' Mean	6,846	8,394	8,819	9,648	11,096	12,204
Control Districts' Range	6588-7120	7633-9140	7644-11135	8309-10922	8892-12431	8940-16450

Table 7 shows the update of the Merrifield (2004) study using the MGT control districts for the latter part of the EVP (2003-2008). These data depict slightly different results. The percent passing TAKS in the control districts grew from 34.9% to 60.6%. The control districts indeed had a higher percent passing in 2008 (3 percentage points above that of Edgewood).

Table 7:

Edgewood District Key Features and Control Group Range for Management Study 2003-2008

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Enrollment	13153	12873	12571	12060	11906	11735
Control Districts' Mean	17607	17945	18255	18519	18676	19020
Control Districts' Range	10018-25186	9928-26444	9723-27306	9653-28061	9786-28833	9804-29966
% White	1.1	1.1	1.2	1.0	1.0	0.8
Control Districts' Mean	2.4	2.3	2.1	1.9	1.8	1.7
Control Districts' Range	0.7-4.7	0.6-4.4	0.5-4.3	0.4-3.8	0.3-3.6	0.3-3.4
% Economically Disadvantaged	96.0	94.5	94.3	92.1	96.5	94.5
Control Districts' Mean	90.2	90.3	90.2	91.0	91.1	90.2
Control Districts' Range	85.9-95.5	86.5-95.6	87.2-96.2	87.2-96.8	86.6-96.5	86.5-96.0
% Passing TAKS	27.5	37.0	43.0	52.0	57.0	57.0
Control Districts' Mean	34.9	43.0	48.2	52.0	56.8	60.6
Control Districts' Range	26.5-42.0	34.0-53.0	35.0-61.0	40.0-65.0	46.0-70.0	52.0-72.0
Mean Composite ACT	15.4	15.3	16.8	16.4	16.5	16.2
Control Districts' Mean	16.8	17.1	17.3	16.9	17.2	17.2
Control Districts' Range	16.1-18.0	16.4-17.7	16.5-18.3	16.2-17.4	16.3-19.0	16.4-18.1
Student/Teacher Ratio	16.3	17.1	19.1	15.7	15.6	14.3
Control Districts' Mean	15.3	15.5	15.5	15.3	15.2	15.3
Control Districts' Range	14.6-15.8	14.9-16.7	14.8-16.2	14.3-16.3	14.6-16.4	14.3-16.7
Taxable Value per Pupil	44,734	50,550	54,101	60,709	66,676	75,178
Control Districts' Mean[a]	63.5	68.5	73.3	77.5	85.3	92.7
Control Districts' Range[a]	56.8-70.9	58.5-78.8	65.5-82.8	68.9-90.3	75.3-98.5	81.1-111.9
State Revenue per Pupil	5,956	6,486	6,249	6,193	6,287	6,637
Control Districts' Mean	5,338	5,828	5,954	5,780	5,757	6,318
Control Districts' Range	5029-5716	5538-6316	5578-6331	5536-6202	5519-6058	5921-6916
Total Revenue per Pupil	7,099	8,729	8,664	9,177	9,697	9,884
Control Districts' Mean	6996	8,362	8,733	8,868	9,198	9,864
Control Districts' Range	6574-7424	8211-8628	8434-9124	8438-9285	8787-9563	9323-10848
Total Expenditure per Pupil	7,086	7,845	9,359	11,499	10,950	10,993
Control Districts' Mean	7,169	8,220	9,326	9,889	9,918	10,755
Control Districts' Range	6671-7770	7882-8774	8236-10950	8475-10874	8638-11452	10004-11548

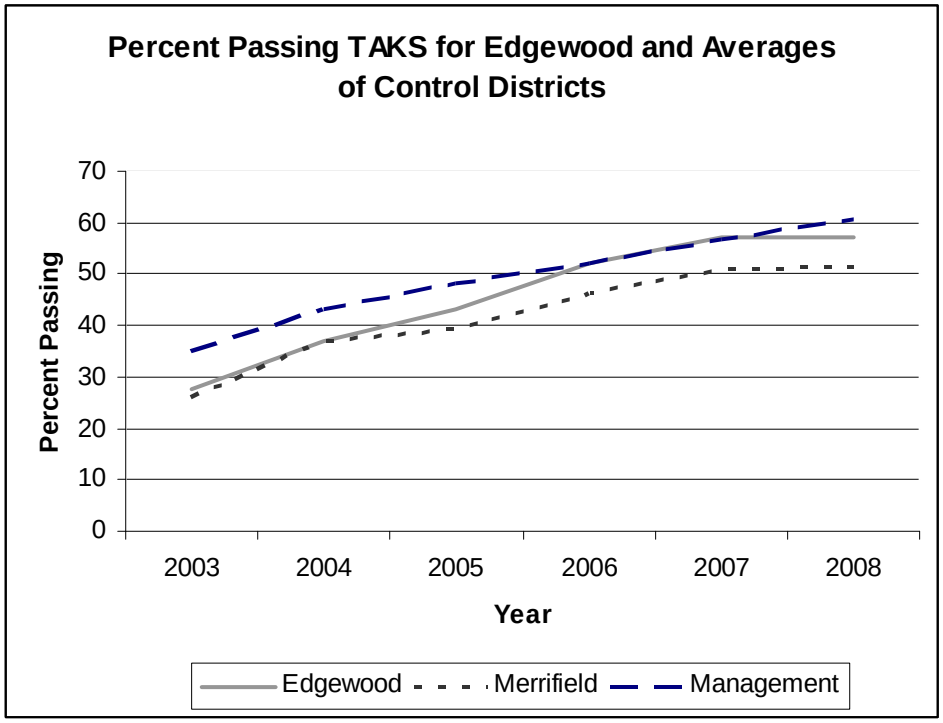
However, those districts started 7.5 percentage points on average above Edgewood. Such statistics indicate that the Edgewood percentage passage rates grew at a greater rate than did those rates in the control districts. Furthermore, some of the districts chosen in the MGT study (1999) are adjacent to EISD. Therefore, those districts may also have felt some voucher pressure either directly or from enhanced media coverage in their area. That means that differences between the EISD schools and the adjacent control districts may be less noticeable.

The percent white and economically disadvantaged statistics indicate a similar story as they did with the Merrifield (2004) control districts. However, those variables for the second set of control districts are closer to those of the Edgewood district. Edgewood has a lower percentage white by approximately one percent, on average, and greater percent of economically disadvantaged by approximately five percent. Those variables indicate that the MGT control

districts may resemble the Edgewood district more closely. The issue with those districts is that the percent passing in 2003 is higher than in the Edgewood district. Without controlling for additional factors, it is difficult to discern if that discrepancy affects our conclusions.

Graph 1 below illustrates the percentage passage rates for the Edgewood district, the Merrifield (2004) control district averages, and the MGT Study (1999) control district averages. The graph better illustrates the rates of change over time for each of the three groups. The EISD line shows a greater slope than do the other two control district averages.

Graph 1



The findings shown in Tables 6 and 7, and in Graph 1, suggest that the EISD did indeed grow at a greater rate than the other control districts. It is quite possible that the slower growth rate towards the end of the time period is due to the fact that the EVP was ending.

Diamond (2007) conducted two separate analyses based on the timeline described above. The author noted a closing of the gap during the first 5 years of the program between the EISD and the state's Hispanic population as a whole and the state overall. The gap in passage rates

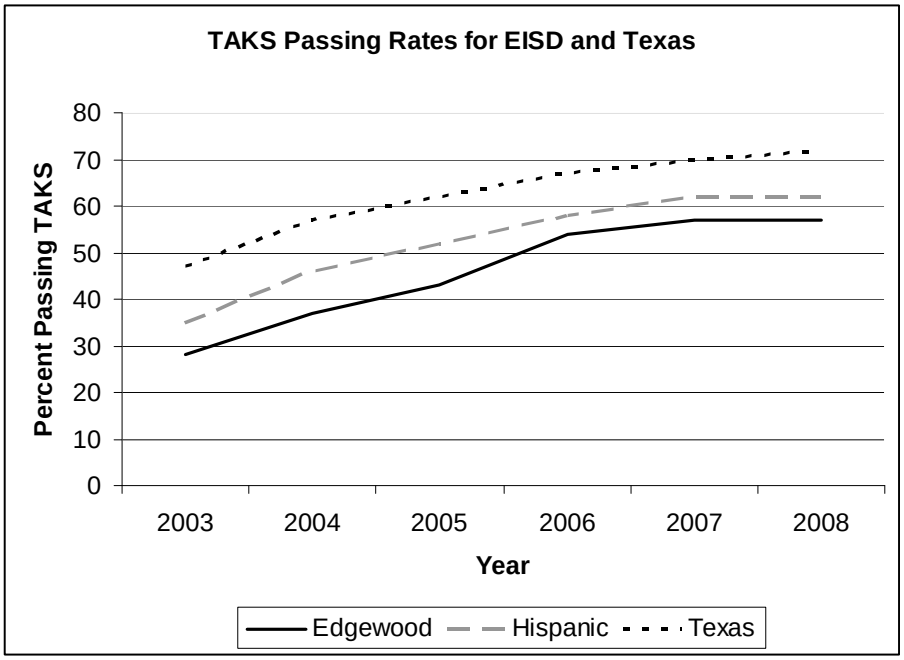
virtually disappeared during this time period between EISD and the Hispanic population. The gap between the EISD and the state closed from 23.7 percentage passing points in 1994 to 5.5 in 2002. The author also charted TAKS passage rates from 2003 to 2006 comparing them to the Hispanic and Texas passage rates. Diamond concluded: "From 2003 to 2006, the percentage of EISD students passing the TAKS grew at an average annual rate of 24 percent in relation to an average annual rate of growth of 12 percent for the state average overall" (Diamond, 2007 p. 14). The closing of the gap in the later years is less dramatic than in the early years of the program. The majority of previous EVP studies concentrated on the years prior to 2003. Those studies consistently indicated positive effects of the voucher program on the EISD traditional public schools. Only Diamond (2007) analyzed the later years in addition to the early years. His analysis found larger gains in the early years with smaller gains in the later years. Since Diamond (2007) compared EISD to the Texas state average and to the Hispanic population average we updated his particular study by collecting the data for the TAKS passing rate for the state, the Hispanic population, and Edgewood. The Diamond (2007) analysis goes through the 2005-06 school year. Thus, the update adds the 2006-07 and 2007-08 school year. Graph 2 shows the updated results. In the previous analysis, Diamond (2007) stated:

> In 2004 and 2005, the passing rate increased for the state as a whole and EISD and at the same time the gap in the state and EISD passing rates remained constant, which implies that the passing rate in EISD was growing more rapidly than the state average overall. In 2006, the EISD passing rate increased by 6 percentage points more than the state passing rate.

It appears, since 2003, EISD has closed the gap slightly; however, in the last two years the gap, if anything, widened. In 2003, the gap between the entire state and EISD was 19, and in 2008 the gap was 15. Unclear, however, in this analysis is the effect of regression to the mean. Because EISD started at a lower level, the district had more opportunity for greater gain. This analysis does not exclude the possibility of regression to the mean. Such an analysis is only

suggestive that EISD performed at a greater rate of growth than did the state, and it does not identify whether the underlying cause is just catch-up or greater effectiveness.

Graph 2



Those analyses are strictly based on the average trend. They do not include any control variables to mediate any potential systematic differences among the districts. Nor did they include any econometric methodology to indicate how much greater the rate of change was for the Edgewood district or whether that change is indeed statistically significant. The econometric analyses described a few pages further below addresses those issues.

In addition to the previous EISD studies, another thread in the existing literature concerns the appropriate methodology for testing competitive or systemic effects. For this discussion, studies analyzing charter school and public voucher programs are insightful. The two most pertinent methodological concerns stem from, one, the choice of the independent variable measuring competition and, two, the econometrics used to eliminate endogeneity issues prevalent in competitive effect studies.

First, although many authors used a variety of measures of competition, the general approach to those measures are similar. Most often, authors used proximity as a measure of competition. They used arbitrary boundaries or district lines around traditional public schools and count the number of charter schools, private schools, or the number of students attending such schools to gauge the infiltration of charter schools or private schools into the traditional public school "market." Those steps specify the level of rivalry pressures.

As noted, those measures include a variety of characteristics. For example, some used zero/one dummy variables to indicate whether a charter school exists within the chosen, arbitrary distance of a traditional public school (Bifulco & Ladd, 2006; Bohte, 2004; Buddin & Zimmer, 2005; Carr & Ritter, 2007; Greene & Forster, 2002; Holmes, DeSimone, & Rupp, 2003; Sass, 2006). Some researchers improved upon the binary approach by counting the number of charter schools or private schools within the arbitrary distance (Bifulco & Ladd, 2006; Bohte, 2004; Buddin & Zimmer, 2005; Sass, 2006). That measure improves upon the previous measure by introducing a greater probability of rivalry change among traditional public schools (Gray, 2009).

The Buddin and Zimmer (2005) proximity measure accounts for the distance to the closest alternative, which is another continuous variable of distance. Yet another rivalry measure involves identifying market share. Sass (2006) and Imberman (2009) used the percent of students attending charter schools in an arbitrary radius of a given traditional public school as the market share measure. The theory with market share is the same as with other proximity measures--the more students attending charter schools in close proximity to a traditional public school, the greater the public school's response to keep or gain back as much of its market share as possible. Hoxby (2001) used a threshold measurement to better indicate the level of competition. Basically, Hoxby argued that some critical mass must exist to stimulate a response from the traditional public school. Specifically, Hoxby surmised that, "[a] school faces 'charter

competition' if at least six percent of the students enrolled in its district are enrolled in charter schools" (Hoxby, 2001 p. 10).

The second methodological concern with systemic effect studies is the econometric problem of endogeneity. Wooldridge (2003) explains an independent variable correlated with the error term in a multiple regression is endogenous. The potential consequence of an endogenous independent variable is that it confuses causation. That is, we may believe charter or private school operators choose the location of their school near poor performing traditional public schools in an effort to attract as many students as possible. If a researcher fails to control for enough variables affecting the location decision, then the researcher may wrongly conclude that charter schools *cause* poor achievement in traditional public schools when actually the charter schools may have purposely located near those public schools.

To address this problem researchers have used a variety of statistical methods to control for as many variables as possible that may affect the location of charter or private schools. Those statistical methods range from using fixed effects transformations on panel data and/or using instrumental variables to eradicate the endogenous variable. Others argue for the 'gold standard' of methodologies, which requires a random process to yield appropriate 'treated' and 'untreated' groups to compare. For example, one set of 'gold standard' studies of school choice effects uses lotteries to select the applicants that gain admission to chartered public schools. The lottery eliminates self selection into the program. However, the EVP did not have a shortage of spaces available during the time period, so it is impossible to employ such an experiment in this case. The debate rages among researchers as to the degree of endogeneity existing in 'gold standard' studies and the effectiveness of the statistical methods to correct it. A potentially more important problem of how the 'shortage' implicit in lotteries impacts the result of a school choice 'treatment' has been largely ignored. The key point here is that a quality study must contain an

exogenous measure of 'competition.' Simply put, the research problem or contribution to the existing literature of this study is: analyzing recent data on the competitive effects of the EVP using a variety of effective control groups without endogeneity to answer the research question of whether traditional EISD public schools improved faster than did other traditional public schools in the control group.

To address those issues, we conducted an econometric analysis using TAKS data between 2003 and 2008 for the control districts used in the previous studies mentioned above and another analysis of the years 1994 through 2002. To control for as many variables as possible, we collected additional data at the school level. Those variables included the percent white, percent economically disadvantaged, average years of teacher experience, student/teacher ratio, and instructional expenditure per pupil.

The TEA only reports percent proficient at the school level; however, it also reports scaled scores at the grade level for the latter years (2003-2008). The literature suggests scaled scores are better measures of academic achievement than percent passing because of the increased variability. For example, let's assume School A has 100% of its students score a 100% on the state exam. School B, however, has 100% of its students score 1 point above the cut-off for proficiency. Note, the percent proficient is 100% for each school, yet School A scored much higher on a scaled score basis than did School B. In one scenario the schools appear identical; in the other scenario the schools are drastically different.

Therefore, we collected scaled score data for grades 3-11 for each school in Texas for the reading and math TAKS tests. We also collected the number of students in each grade that took each test and the all of the demographics of the test takers. This step allows for a more accurate regression equation as the percent white and economically disadvantaged are based on the test takers rather than the self-reporting of the school overall. So, for example, K-2 demographics are

not included in the regression because test scores were not collected on those grades. We then calculated weighted averages of the demographic variables for each grade in each school and aggregated the data to the school level based on the state provided school identification number. This step yields school level demographic variables based on those students who actually took the test. We collected those data for all schools in all the control districts used in the previous Edgewood studies to conduct more complex statistical analysis on the last few years of the voucher program. In addition to these control schools, we used another set of control schools from the set recommended by the TEA. The TEA identifies forty schools for each traditional public school to serve as a comparison group. We randomly chose five comparison schools out of each set of forty to create another control group.

For the earlier years (1994-2002), we collected data on percent passing the TAAS reading, math, and all tests (includes writing). We also collected data on similar demographic variables for schools including percent white, percent disadvantaged, and student-teacher ratio. Financial and staff data also included operation expenses per pupil and average years of experience.

The results of this data collection allows for the completion of the desired reports using a variety of different control groups. Using these differing groups yields a set of results to compare. That is, if results from different studies with different control groups yield similar results, then our confidence in our findings increases.

Table 8 has the complete results of the two-stage model of the math test scores. Those results stem from using equations 2 and 3 (see Technical Appendix B). The Table 8 results are for the EISD and the Merrifield (2004) control districts. The table shows seven different models to illustrate the completeness of the analysis and to show the small variation the models. Table 8 presents all level 1 and level 2 results for all models including the variance components, which indicates whether additional variables help explain variation in a meaningful way. We will only

show complete results for one of the analyses; henceforth, tables for the multi-level analysis will only show results for one model and for the variable of interest, the voucher variable.

Table 8

Results of Multi-Level Models for Change in TAKS Math Scores to Vouchers

		Parameter	Model A	Model B	Model C	Model D	Model E	Model F	Model G
Fixed Effects									
Initial Status, π_{0i}	Intercept	γ_{00}	2144.41***	2109.51***	2108.83***	2108.10***	2060.52***	2028.13***	2006.55***
			(8.35)	(9.66)	(10.92)	(13.28)	(24.68)	(52.71)	(33.06)
	Voucher	γ_{01}			-1.76	-0.88	1.72	-1.60	-2.22
					(22.93)	(23.99)	(23.32)	(24.02)	(23.77)
	Percent White	γ_{02}				-8.22	20.96	25.77***	8.27
						(61.67)	(61.56)	(61.94)	(62.47)
	Percent Disadvantaged	γ_{03}					48.55**	36.96*	43.37**
							(21.43)	(21.00)	(21.29)
	Average Years Teacher Experience	γ_{04}						-2.77	
								(2.17)	
	Student/Teacher Ratio	γ_{05}						0.32	
								(1.79)	
	Instructional Expenditure Per Pupil (1000s)	γ_{06}						13.9**	16.5**
								(5.5)	(6.5)
Rate of Change, π_{1i}	Intercept	γ_{10}		14.22***	12.62***	8.16***	12.83 (7.86)	53.23***	31.09***
				(1.63)	(1.80)	(2.44)		(17.26)	(7.74)
	Voucher	γ_{11}			8.13**	11.94***	10.98**	11.25**	12.28***
					(4.05)	(4.44)	(4.44)	(4.48)	(4.67)
	Percent White	γ_{12}				55.19***	49.49***	47.28***	51.32***
						(14.42)	(14.60)	(14.72)	(15.39)
	Percent Disadvantaged	γ_{13}					-4.58 (7.82)	1.28	-.18
								(7.92)	(8.08)
	Average Years Teacher Experience	γ_{14}						-.011	
								(0.59)	
	Student/Teacher Ratio	γ_{15}						-1.11	
								(0.64)	
	Instructional Expenditure Per Pupil (1000s)	γ_{16}						-7.44***	-5.97***
								(1.87)	(1.74)
Variance Components									
Level 1	Within School		2032.06***	942.65***	933.30***	890.48***	887.56***	809.81***	825.03***
			(157.40)	(84.82)	(83.70)	(81.60)	(81.90)	(77.02)	(78.36)
Level 2	In Initial Status		5488.21***	7142.85***	7040.35***	7109.86***	6620.82***	6809.72***	6930.87***
			(926.30)	(1224.00)	(1204.00)	(1256.00)	(1197.00)	(1221.10)	(1254.29)
	In Rate of Change			132.49***	128.37***	153.53***	151.86***	152.31***	184.50***
				(36.33)	(35.20)	(42.20)	(41.80)	(45.55)	(50.12)
	Covariance			-537.36***	-528.69***	-691.28***	-649.30***	-633.99***	-755.43***
				(169.90)	(167.00)	(195.00)	(190.00)	(197.63)	(212.50)
Log Likelihood			-2311.73	-2219.04	-2216.08	-2207.41	-2204.35	-2194.12	-2198.92
N			421	421	421	421	421	421	421
		Deviance	4623.46	4438.08	4432.16	4414.82	4408.70	4388.24	4397.84
		Dev. Diff.	185.38	5.92	17.34	6.12	20.46	-9.60	4397.84
		AIC	4629.46	4450.08	4448.16	4434.82	4432.70	4424.24	4425.84
		BIC	4641.59	4474.34	4480.50	4475.25	4481.21	4497.01	4482.44

Note: ***, **, and * indicate statistical significance at the .01, .05, and .1 levels, respectively.

The coefficient of interest in Table 8 is γ_{11}. This coefficient represents the rate of change in a school's math achievement level for a school residing in the Edgewood district. The γ_{11} coefficients are fairly consistent across models showing a range 8.13 to 12.28 scaled score points on the TAKS math exam. In this case, the effects on the voucher district schools are statistically significant. To be specific, let us interpret Model C (the model only using the voucher effect) in terms of non-voucher district schools compared to voucher district schools. The coefficient on γ_{00} is the population average initial status and γ_{10} is the population average rate of change during the time period of study. To be sure, substituting the values into the regression equations yields the following estimated initial status and growth rates for non-voucher and voucher district schools:

Non-voucher district schools:

$$\hat{\pi}_{0i} = 2108.83 - 1.76(0) = 2108.83$$

$$\hat{\pi}_{0i} = 12.62 + 8.13(0) = 12.62$$

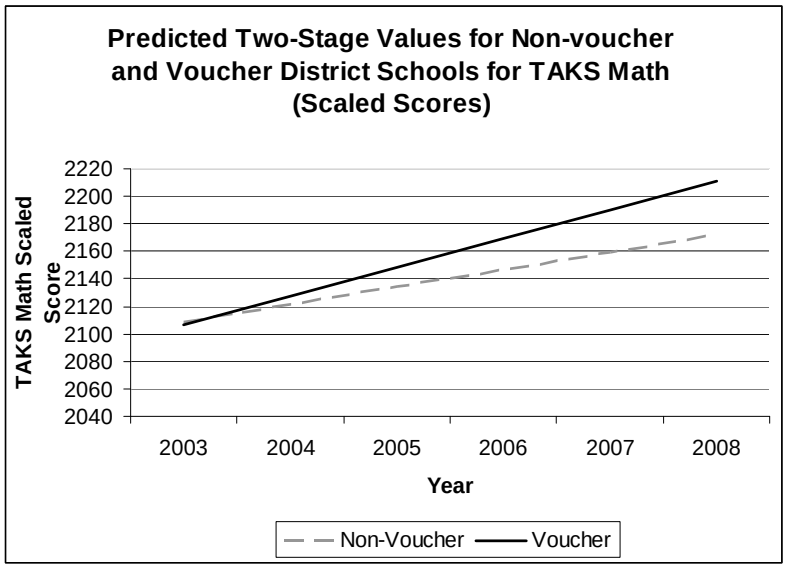
Voucher district schools:

$$\hat{\pi}_{0i} = 2108.83 - 1.76(1) = 2107.07$$

$$\hat{\pi}_{0i} = 12.62 + 8.13(1) = 20.75$$

To interpret these numbers, one would say that the initial starting TAKS math score was 1.76 points lower in schools residing in a district with vouchers present than those in a non-voucher district, which is a statistically insignificant difference. In addition, voucher district schools have slope estimates on the rates of change 8.13 points higher than non-voucher districts, which is statistically different from 0. That means we are 99% confident that the voucher district schools grew at a greater rate on the TAKS math test than did the Merrifield (2004) control district schools. Graph 3 shows a graphical representation of the predicted values for the TAKS math scaled scores.

Graph 3



The greater slope of the 'voucher' line visually illustrates the higher rate of improvement seen by the EISD schools. The effect size is .09, which means that voucher district schools gained almost a tenth of a standard deviation over their non-voucher district counterparts. The existing literature on competitive effects often finds statistically significant positive effects with a magnitude of approximately one tenth of a standard deviation. Therefore, our finding for the EVP's impact on EISD is consistent with other findings.

We highlighted that Model C result to illustrate the interpretation of the coefficients. The other models, however, have similar estimates for the rate of change voucher effect. The other covariates do not seem to add much to the explanatory power of the models. Furthermore, the additional covariates do not affect the magnitude of the voucher estimates. All of the estimates are at least statistically significant at the .05 level.

Which of the models is correct? Unfortunately, choosing the best model is more of an art than a science. However, the deviance, AIC, and BIC statistics listed at the bottom of Table 8 give some indication of the best model given the available data. The lowest deviance, AIC, and BIC statistics probably indicate the best models. On that basis, it appears Model D provides the

best opportunity to draw conclusions about the voucher program's effect on TAKS math scores using the Merrifield (2004) control districts.

However, none of those models explain a major amount of the variation in TAKS math scores among the schools in the dataset. The lack of explanation suggests that there may exist additional variables that are unobserved that may also explain the variation in test scores. Omitted variable bias could be distorting the coefficient estimates for the voucher variable. Unfortunately, more specific or additional data are unavailable. The variables used in our analysis have also been used in other studies evaluating systemic effects.

Table 9

Results of Multi-Level Models for Change in TAKS Reading Scores to Vouchers

		Coef	Merrifield (2004)	Management (1999)	New Control Schools
Fixed Effects					
Initial Status, π_{0i}	**Intercept**	**γ_{00}**	**2062.24*** (19.72)**	**2066.16*** (33.07)**	**2083.87*** (25.95)**
	Voucher	**γ_{01}**	**-2.66 (15.21)**	**-14.85 (12.50)**	**-10.87 (12.02)**
Rate of Change, π_{1i}	**Intercept**	**γ_{10}**	**32.22*** (6.43)**	**-0.91 (58.03)**	**46.84*** (7.98)**
	Voucher	**γ_{11}**	**5.08 (3.70)**	**0.08 (2.50)**	**-1.70 (2.93)**
Level 1	**Within School**		**571.00*** (53.03)**	**322.00*** (23.21)**	**284.23*** (21.29)**
Level 2	**In Initial Status**		**2510.43*** (504.17)**	**2111.85*** (302.59)**	**1925.24*** (293.72)**
	In Rate of Change		**117.50*** (30.47)**	**51.42 (11.09)**	**96.13*** (16.68)**
	Covariance		**-436.10*** (111.86)**	**-220.28*** (49.69)**	**-317.20*** (61.58)**

Table 9 shows the regression results from analyses using different groups of control schools for the reading tests and Table 10 presents the results for the math tests. Since interpretation of the coefficients is the same as discussed above, we conclude that our results are robust with respect to random selection of the control schools. The results in Table 9 only show

the voucher effect coefficients although the models did indeed use additional covariates to estimate the equations. For the TAKS reading test scaled scores, the voucher district schools appeared to perform about the same as their peer schools in non-voucher districts. Although two estimates are positive while one is negative, none of the coefficients are statistically different from zero indicating a null effect for the voucher program on reading scores.

Table 10 shows similar results for the math test to those noted above. The one statistically significant result occurs with the Merrifield (2004) control districts. The other control school

Table 10

Results of Multi-Level Models for Change in TAKS Math Scores to Vouchers

		Coef	Merrifield (2004)	Management (1999)	New Control Schools
Fixed Effects					
Initial Status, π_{0i}	**Intercept**	**γ_{00}**	**2108.10*** (13.28)**	**2048.11*** (47.80)**	**2066.71*** (28.84)**
	Voucher	**γ_{01}**	**-0.88 (23.99)**	**-27.31 (18.82)**	**-22.46 (16.98)**
Rate of Change, π_{1i}	**Intercept**	**γ_{10}**	**8.16*** (2.44)**	**54.51*** (20.44)**	**55.30*** (10.14)**
	Voucher	**γ_{11}**	**11.94*** (4.44)**	**2.52 (2.71)**	**-1.92 (3.34)**
Variance Components					
Level 1	**Within School**		**890.48*** (81.60)**	**472.12*** (34.00)**	**462.52*** (34.70)**
Level 2	**In Initial Status**		**7109.86*** (1256.00)**	**5380.24*** (738.67)**	**4136.93*** (604.12)**
	In Rate of Change		**153.53*** (42.20)**	**44.57*** (11.51)**	**109.64*** (20.48)**
	Covariance		**-691.28*** (195.00)**	**-54.91*** (66.81)**	**-262.28*** (85.43)**

regression analyses indicate null effects for voucher effects over time. The question is: which of these, if any, is the right group of control schools for comparison. It appears the Merrifield (2004) control districts are very close to the initial status of the Edgewood districts. The other control schools' initial status is much higher than that of the Edgewood district. With the initial

status being different between the Merrifield (2004) districts and the others, it calls into question the validity of the other two sets of controls. A statistical difference at the beginning of the analysis period could indicate systematic differences between the treatment group and the control group. Furthermore, it is more likely the Merrifield (2004) control districts contain better comparisons. The MGT (1999) study control groups includes three districts near or adjacent to EISD, so some voucher program effects may exist in the control districts through positive media effects and because many voucher users were not EISD residents prior to the program. Non-EISD, San Antonio-area schools public schools probably lost students to voucher schools.

The second part of the econometric analysis used the Singer and Willet (2003) strategy on the TAAS percent passage rates for reading, math, and all tests taken from 1999-2002 (the early EVP years), and we also used a fixed effects regression comparing the EISD schools before and after the implementation of the program. The results are significantly positive to null, depending on method. For the Singer and Willett (2003) approach, the results using any of the control district combinations yielded insignificant results ranging from estimates of .50 on the reading test to -1.39 on all tests combined. However, the fixed effect models revealed all positive and significant effects for the Edgewood schools experiencing a voucher threat between and including 1999 and 2002. Table 11 shows the estimates of the fixed effects regressions with regard to the voucher effect. Those results indicate that Edgewood public schools responded positively to the voucher program showing .41 to .54 standard deviation gains in the percentage passage rates on the TAAS exam. When comparing Edgewood scores after the introduction of the program to Edgewood schools before the program, we observe fairly large gains in the percent of students passing the respective tests. Those results suggest a different finding from the Singer and Willett approach on similar data during the 1999-2002 time period. The fixed effect results are more consistent with previous studies' findings by other authors.

Table 11

Results of Fixed Effect Regressions from 1994 to 2002 for Voucher Effect on TAAS Percentage Passage Rates					
	Estimate	St. Err	p-value	R^2	Effect Size
All Tests	14.12	1.26	0.00	0.594	0.54
Reading	12.50	0.96	0.00	0.330	0.48
Math	10.81	1.21	0.00	0.561	0.41

School Ratings Analysis

We conclude our assessment of the EVP's impacts on the academic performance of EISD students with a look at the changes in the school ratings issued annually by the Texas Education Agency (TEA). The pattern of change largely matches the findings described so far. There was noteworthy positive change early on, and then some drop off as the EVP neared expiration, though less of a drop off here compared to the control districts than for some of the other EVP effects discussed so far.

A consistent annual rating of a district by the Texas Education Agency (TEA) can mask considerable change at the school level. For example, EISD's rating rose from 'acceptable' to 'recognized' in 1999-00, and then returned to 'acceptable' for the remaining EVP years. School year 1999-00 was the first year that EISD had an 'exemplary' school. EISD went from zero exemplary schools prior to 1999-00 to three of them that year. Though the district rating fell back to 'acceptable' after 1999-00, EISD maintained its three exemplary schools and nine recognized schools (compared to three in 1997-98 – see Table 12) through 2001-02. That happened even though TEA tightened exemption requirements in 1999-00 and 2000-01, which meant that formerly exempt students, like those with limited English proficiency, had to be tested and included in the reported scores. An interviewee that was an EISD teacher during that time said that the district drop-off from 'recognized' in 1999-00 back to 'acceptable' the next year occurred

because of the tightening of the exemption limits. While the number of 'exemplary' schools stayed at three, and the number of 'recognized' schools stayed at nine, two of the 1999-00 'acceptable' schools fell to 'low performing' in 2001-02, which must have been the reason for the district rating falling to 'acceptable.' Thereafter, with the transition from TAAS to TAKS, EISD basically returned to its 1997-98 mix of 'acceptable' and 'recognized' schools, and then rebounded by 2007-08 to a roughly 50-50 mix of 'recognized' and 'acceptable' schools.

As a comparison of Table 12 for EISD and Table 13 for the core Merrifield (2004) control districts demonstrates, the basic trends above are evident in Port Arthur and Waco, but not West Oso or Robstown. West Oso improved slightly from 1998 to 2000, and then lost all three of its recognized schools by 2002, and Robstown showed little change at the school ratings level from 1998 to 2002, so EISD clearly out-performed them. EISD also out-performed Port Arthur, which showed little change from 1998 to 2000, then a modest surge into 2002, where it briefly claimed a single 'exemplary' school, and an additional 'recognized' school. The 1998 to 2002 EISD and

Table 12: School Ratings by the Texas Education Agency for EISD

	1997-98	1999-00	2001-02	2004-05	2007-08
Exemplary	0	3	3	0	0
Recognized	3	9	9	3	9
Acceptable	19	11	9	16	8
Unacceptable, or Low-Perf.	1	0	2	1	0

Waco changes are comparable. Waco looks equal to slightly better than EISD in the rise in the number of 'exemplary' schools, but worse than EISD in that Waco never eliminates its low-performing campus, which EISD did, and then Waco adds a second low-performing campus by 2002 to match EISD's total of two low-performing campuses in 2001-02.

Table 13: School Ratings by the Texas Education Agency for four EISD Control Districts

Port Arthur

	1997-98	1999-00	2001-02	2004-05	2007-08
Exemplary	0	0	1	0	0
Recognized	3	4	5	2	1
Acceptable	11	10	7	12	6
Unacceptable, or Low-Perf.	1	0	1	1	5

West Oso

	1997-98	1999-00	2001-02	2004-05	2007-08
Exemplary	0	0	0	0	0
Recognized	1	3	0	0	0
Acceptable	4	2	4	4	4
Unacceptable, or Low-Perf.	0	0	0	0	0

Waco

	1997-98	1999-00	2001-02	2004-05	2007-08
Exemplary	2	6	7	0	0
Recognized	3	7	10	3	9
Acceptable	21	16	10	5	4
Unacceptable, or Low-Perf.	1	1	2	5	4

Robstown

	1997-98	1999-00	2001-02	2004-05	2007-08
Exemplary	0	0	0	0	0
Recognized	4	4	5	4	2
Acceptable	5	4	3	2	5
Unacceptable, or Low-Perf.	0	0	0	1	0

From 2005 to 2008, EISD significantly increased its 'recognized' campuses from three to nine, and eliminated its low-performing campus. Those gains significantly out-performed three of the control districts, and slightly out-performed Waco, which developed six new 'recognized' campuses, and reduced its 'unacceptable' count by one. But Waco still had four 'unacceptable' campuses, while EISD had none in 2008. The EISD gains may reflect the culmination of some political struggles[14] in the early part of the decade to close some schools, build two new ones, raise teacher salaries, and increase teacher participation in policymaking. Jarboe (2005) notes

that, “in the past four years (2001 to 2004), after Ramiro Nava and two other trustees in their thirties were elected to the board, a reform-minded majority has attempted to upgrade the management of the district. Administrative jobs have been cut (EISD’s instructional expenditures now represent 65.8 percent of its budget, higher than Alamo Heights’ 63.5 percent), and starting teachers’ salaries have been increased. A beginning [EISD] teacher this fall (2004) is scheduled to make $37,500, compared with $36,100 for a beginning teacher at Alamo Heights.” Despite the suggestive coincidental timing, the key players in those struggles did not credit the EVP with motivating or accelerating the process, but they may not know the extent to which the EVP changed the decisionmaking climate or the potential for change.

Voucher User Effects

The voucher amounts varied according to grade level and whether the school was inside the EISD, or located outside the district. For high school students attending a school outside EISD, the voucher amount was $3500/year through 2000-2001, and $4200 thereafter. The annual amount was $500 higher for users of in-district high schools. The lower grade voucher amounts were constant throughout the 1998-2008 term of the EVP. It was $2000/year outside EISD, and $3600 for users of in-district schools. The CEO Horizon database of private schools enrolling voucher users included 177 schools. Five schools enrolled the substantial majority of the voucher users. Those schools were El Sendero, Holy Cross High School, Christian Academy of San Antonio (CASA), St. John Bosco, and St. John Berchman’s. Many of the remaining 172 schools are too far from Edgewood to be relevant, and many no longer exist. A few were storefront/strip center academies set up to recruit voucher users. That any family would opt out of a public school system funded at over $10,000 per student per year (local, plus state and federal dollars per child) for a hastily cobbled-together, unproven start-up is a testament to: a.) the significance to

some children of very narrow specializations that are only possible in tiny schools; b.) awesome gullibility/child neglect; or c.) crisis/dysfunction in the assigned neighbor-hood public school. Close scrutiny of seemingly bizarre choices was beyond the scope of this study, but it needs some attention, and will eventually get some through the data archives leftover from the EVP.

Some of the private schools chosen by voucher users had tuition rates above the voucher amount. For example, the parents of voucher users attending Holy Cross High had to top off the voucher funds with personal funds ranging from $1600/year through 2001, and $900/year thereafter. Despite such significant costs, none of the thirty-two survey respondents that reported exiting the EVP before their child had graduated said it was because of increased costs.

As noted above, there was no way to attribute a change in academic progress to participation in the EVP. There was no counter-factual to use as a benchmark. That is, we have no basis to estimate what the voucher users' achievement level would have been had they not been EVP participants. For the EVP participants that would have attended EISD public schools, or public schools in neighboring districts, we only know that a voucher greatly improved their probability of graduating and attending college. While EISD's four-year graduation rate peaked at eighty percent in 2004, the three private schools with grades 9-12 that schooled the vast majority of the older voucher users reported graduation rates and college attendance rates approaching 100%. For example, CASA reported 100 percent graduation, 100 percent college attendance, and ~$500,000 in college scholarship offers. At Holy Cross High, a college acceptance letter is a graduation requirement. El Sendero reported a graduation rate over ninety percent for the full ten year EVP term, and that all of their 2007-2008 graduates were in college or the military. Those findings are consistent with Diamond's (2007) finding of 91 and 93 percent college attendance rates for CEO Horizon graduates in 2005 and 2006, respectively. In contrast, the share of EISD students taking college admission tests barely topped sixty percent in 1999,

2000, and in 2007 (see Appendix B). It stood at 57 percent in 2008. That rate, which reasonably signals interest in college, but not necessarily a commitment to attend, assuming admission, is far below the voucher user college attendance rates.

Several of the former EISD officials I spoke with, and that were quoted in the media, cited intense and selective CEO Horizon recruiting as major factors in the 'success' of the EVP students, and causes for concern by the district. Since that is a common charge ("creaming" – see Merrifield, 2008b and chapters 14, 16, and 18 of Greene, 2005) of school choice reform skeptics, it was a centerpiece of the first EVP study, a 1999 Harvard/Mathematica study (Peterson et al, 1999). Diamond (2007) summarized the Peterson et al (1999) findings as follows:

> "An evaluation of the first year of the Horizon program by Peterson et al (1999) shows that Horizon participants were generally very similar to the EISD student population. Their evaluation of the program showed that test scores for students in the first year were generally similar across Horizon participants and EISD public school students. In fact, Horizon students only scored in the 37th percentile in math and 35th percentile in reading—far below average on the Iowa Test of Basic Skills. In contrast to the "best and brightest" argument put forth by opponents of school vouchers, they report that 29 percent of public school students had been in programs for gifted students compared to 23 percent of voucher students. In the initial year of the program, Horizon participants and non-participants were no different in terms of scores on standardized exams.
>
> In addition, 8 percent of the EVP participants were identified by their parents as having learning disabilities. EISD and Horizon students also exhibited similar demographic characteristics. Peterson et al (1999) reported that 96 percent of voucher students were Latino in comparison to 93 percent of EISD students."

Diamond (2007) went further. He compared the 1999 median income levels of families with children enrolled in EISD schools to the income levels of EVP participants and found the 1999 median family income of EVP participants to be 37 percent lower ($16,807 vs. $26,865) than for EISD school families. Consistent with theory, and experience with school choice (Merrifield, 2008b), it is the struggling students that prompt their parents to seek out new schooling options for them (Hoxby, 2003).[15]

The ‘creaming’ claim has some public credibility because it is consistent with the false stereotype that private schools are exclusive and expensive enclaves of the super-rich that maintain the schools’ reputations for quality by only accepting top students. But most private schools in the current U.S. school system are not exclusive or expensive. The typical U.S. private school spends much less per pupil than nearby public schools, and when they ‘select,’ they do so only according to their specialized missions, not according to general ability. The private school imperative to specialize and thus keep quality up for the targeted students and costs within their much leaner per pupil budgets is the basis for the claim that ordinary private schools turn away some special needs students. No school can specialize in everything. As in the private sector of schooling, it is the public school system as a whole, not each individual school that addresses the full spectrum of student interests and needs.

Greene (2005 and 2000) addressed the ‘creaming’ claim in his surveys of the voucher evidence, again finding no basis for it. He said that if creaming is an effect of voucher programs, “creaming should have been visible in Edgewood. It was not (2000).”

The Greene (2000) and Peterson et al (1999) findings have been in the public domain for nearly a decade, yet some people continue to insist that CEO Horizon engaged in ‘cherry-picking;’ refusing vouchers to all but pre-EVP private school users and the EISD’s best and brightest. Unaware or skeptical of the reliability of those independent assessments, the people that insist that CEO engaged in ‘cherry-picking’ should at least trust the data that EISD reports to the Texas Education Agency. Those data indirectly, but still strongly, confirm the Greene (2000) and Peterson et al (1999) independent findings that refute the ‘creaming’ claim. If the EVP had, as claimed by the EVP ‘success’ story skeptics, recruited EISD’s best and brightest, how would it have been possible for EISD to achieve the surge in performance that occurred from 1998-2002, when several EISD schools vaulted from ‘acceptable’ to ‘recognized,’ and from ‘recognized’ to

'exemplary.' EISD graduation rates could not have improved from 57 to 80 percent from 1998 to 2004 – much faster than in the control districts – without EISD's best and brightest in EISD schools. If 'cherry picking' had occurred, it would have been a monumental achievement for EISD to keep pace with the control districts, but EISD out-performed them by a wide margin, especially in the early years when the alleged 'cherry-picking' supposedly occurred.

Non-Voucher Private School User (self-payer) Effects

We tried to gain some insight into this rarely visited issue through the interviews with the schools that enrolled the largest number of voucher users. As noted in the previous section, those schools were El Sendero, Holy Cross High School, Christian Academy of San Antonio (CASA), St. John Bosco, and St. John Berchman's. The answers were fairly consistent. A very small number of the 'self-pay' parents complained about the slower pace that they expected would result from the addition of the voucher users to the classrooms attended by their children. None of the private school interviewees said that classroom environments improved as a result of adding the EVP students. In fact, none of the private schools offered that the addition of the voucher users changed the delivery of instruction, but we sensed some transitional challenges in the description of the remediation provided to lagging voucher users. The private school leaders described the remediation as successful, so that differences between self-pays and voucher users disappeared quickly.

One issue that one might expect to impact instruction and annoy the self-pay private school users would be increased class size and facility crowding, generally. However, this was not seen at any of the five schools that admitted large numbers of voucher users. The growth in the student body was so significant that they added classrooms and teachers, holding class size approximately constant. One school had to add portable classroom buildings to its campus. The

other schools had excess capacity so that the new classes had comparable facilities to the original classes. CASA and El Sendero were among the schools that formed to meet voucher user demand. At the end of the EVP, the El Sendero Academy converted to a chartered public school, forsaking its religious identity with a new curriculum to eliminate tuition and thus retain the voucher users, and expand its enrollment to five hundred students. They have a wait list, and have applied for permission to increase enrollment to 600. CASA, the other large private school that started up during the EVP, maintained its enrollment through expanded student financial support from its founder, the Covenant Foundation, one of the major EVP funders.

Changed Lives

We assessed this impact through a random phone survey of 156 voucher user households, and by examining some publicized testimonials. Consistent with past results and careful, rational parental behavior on behalf of their children, we found the expected voucher user preference for the chosen school over the assigned school. That expectation signifies the importance of diverse schooling opportunities to address the diverse interests and learning styles that exist among the students of any area. Therefore, because every area's student population is more academically diverse than any public school system can be,[16] an EVP-like voucher program would prompt a significant number of families to opt out of the best public school system in America.

Even without competitive effects, the choosers probably help the non-choosers by removing restless, bored, overwhelmed, and non-mainstream ('outliers' in terms of learning style or subject preferences) students from public school classrooms and leaving behind a more academically homogenous, easier to teach, public school classrooms. Little or no research has been done to test that theory, but it follows logically from the fact that choosers thought that their children did not fit in their EISD classrooms, while the non-chooser majority thought their

children did fit there. In EISD, the non-choosers out-numbered the voucher users roughly eight to one, on average, over the ten year term of the EVP.

So, some level of preference by choosers is a certainty, but the EVP participant degree of preference is noteworthy. There was no buyers' remorse. One of the 156 survey respondents did not answer that they were glad that they had sought a voucher, but 100 percent said the EVP had "positively impacted the development of their voucher using-children ***a lot*** (emphasis added)." 'Helped their development a little bit' was a response option. But all respondents opted for 'a lot' over 'a little bit.' Only 10.3 percent cited religious instruction as the main reason for seeking a voucher. The remainder cited improved academics (82.1%) and safety (7.6%) as the decisive reasons for seeking a voucher.

The published testimonials of EVP participants are consistent with the press reports of voucher and charter school lotteries, where winners (akin to EVP discoverers) react with a combination of relief and jubilation. By chance, a June 17, 2009 front-page *Education Week* article was on my desk as I (JM) wrote this. It had a photo of a charter school lottery winner in a tears-of-joy, jubilant bear hug with a teacher, in a room full of envious onlookers. A similar reaction was evident among the EVP discoverers.

It seemed that loyalty and inertia were the primary reasons for being a non-chooser, and that once families got over those psychological hurdles, there was a high level of disdain for EISD schools. Several factors support the inference that voucher preference was more than just increased availability (affordability) of schooling product differentiation to address the unusual preferences of non-mainstream children. If EISD schools are just unsatisfactory for 'outlier' children, we would expect the vast majority of voucher applicants to have just a single child enrolled in the EVP. But the typical voucher applicant had multiple children using vouchers. Clearly, failure of the EISD mainstream 'one size' to fit all was not the only significant motive of

voucher applicants. From the perspective of most voucher applicants, the EISD 'size' was a bad fit for many of their diverse children. Nearly forty percent of the survey respondents had three or more children participating in the EVP. Voucher use was growing until, six years into the EVP, budget constraints prompted the limitation of voucher use to continuing users. But for that, 2004-05 voucher use would have been higher than the 2003-04 peak use, and might have continued to grow beyond that. One former EISD official offered that "loyalty" had been the primary reason that students and teachers stayed in EISD, and that much had been accomplished by 2005 to become more competitive and provide tangible reasons (like higher teacher salaries) for them to stay. All but one survey respondent reported having been pressured by neighbors to not participate in the EVP. None reported pressure from neighbors to participate in the EVP.

So, at this early juncture, it already appears that the EVP has directly and significantly enhanced the lives of thousands of children, and their parents enjoyed reduced anxiety, increased peace of mind, and pride in the enhanced accomplishments of their children. All of the survey respondents said their children were going to college; an answer consistent with the college attendance data offered by the private school officials that we interviewed. Especially during the early years of the EVP, it also seems to have indirectly enhanced the lives of EISD students and their teachers, who also enjoy an echo effect in the form of the higher salaries enacted earlier this decade. The nature of changed adult lives will become apparent as more of the EVP participants graduate from college and become active members of the community. Follow-up tracking of EVP participants is already budgeted through 2011.

Summary and Integration with the School Choice Literature

In the American perspective, voucher programs are new. The foreign programs like the New Zealand public school choice program, the Chilean, Dutch, and Swedish voucher programs,

and the longstanding rural Vermont and Maine programs, are not well known. Until the EVP, the U.S. did not have a universal urban program.

Many outcomes of the EVP and the well-known, targeted programs like Milwaukee and Cleveland are similar. In all cases, the voucher users were overwhelmingly happy with their decision to exit their assigned public school (Walberg, 2007; Greene, 2000 and 2001). Transfers to private schools yielded academic gains (Greene, 2000, 2001, and 2005; Holland and Soifer, 2002; Howell and Peterson, 2002; Teske and Schneider, 2001). No study found a decline in the academic performance of any student sub-group (Walberg, 2007). The EVP findings further refute alarmist claims that any voucher program would yield noteworthy negative effects like public school deterioration, decreased diversity, creaming, and inattention to the community-wide, spillover benefits of schooling.

The targeted voucher programs prompted some negative public school system responses like stalled paperwork, onerous paperwork demands, misinformation, slander, and intimidation (Hess, 2002; Hess et al, 2001; McGroarty, 1996). They were only barely evident in reactions to the EVP.[17] There were some attacks on the EVP's sponsors, which happened with some of the other voucher programs. For example, Pepsi offered to fund vouchers for some low income New Jersey children. But after a dramatic increase in vandalism of its vending machines and a threat by the New Jersey teacher union to urge a statewide boycott of Pepsi products, Pepsi withdrew its offer.[18] Likely controversy about the effects of school choice, which might harm EVP supporters financially, prompted some early EVP supporters like the *San Antonio Express-News* to withdraw their financial support.

The EVP outcomes have significantly increased our understanding of voucher programs beyond what we could learn from the study of restriction-laden, small, targeted voucher programs that are the U.S. norm, and to lesser extent, the norm internationally.[19] However, we still lack

direct empirical evidence for the large, permanent, unrestricted voucher programs that Milton Friedman said could leverage "entrepreneurial initiative."[20] We can surmise from the early years of the EVP, when no one could be certain that the voucher program would not be permanent, that large, unrestricted voucher programs will leverage a combination of media attention and competitive pressure sufficient to yield noteworthy improvement in the public school system.

We can also see that 'school choice' can be a significant growth magnet. Even taking the typical 2:1 defeats of statewide voucher program ballot initiatives at face value[21] – that voters generally understood what a voucher program was and that 2/3 of them didn't want one – the preferences of the other 1/3 of the population segment that votes for leveling the playing field between public and private school choices are enough people to quickly drive significant economic development.

Still it is important to note that regarding direct empirical evidence of effects of market accountability in K-12 education, little has changed since 1992 when James Catterall (1992) noted that, "the free market never got its day in court (p 351)," and Charles Manski (1992) said that, "we know very little about the educational consequences should a *systemic* choice proposal be adopted (p 351)." In the June, 2007 *American Economic Review*, Maria Ferreyra (2007) noted that there are "no data available to analyze the impact of a large-scale voucher program in the U.S (p 789)." Hess (2002) said that existing U.S. school choice programs generate market pressures akin to a "pick axe," not the "bulldozer" pressures that would result from fully unleashing market forces.[22] The EVP was an unusually large temporary pick-axe, but it didn't have the time and financial support to morph into a bulldozer. We may need the bulldozer to yield the school system transformation that nearly everyone agrees, generally, is a prerequisite for substantially improved performance. We know that the public school system is very resistant to change (Finn, 1997; Ginsberg and Plank, 1995; Merrifield, 2009; Tyack and Cuban, 1995). With the exception

of Lankford and Wyckoff (1992), Gill et al (2001), and Hill (1999), the critical issue of potential supply responses to rivalry pressures has been mostly ignored. And for reasons just given, we could not include long-run supply responses in our EVP assessment. Relevant data have yet to be identified, fully vetted, and analyzed.

Some readers will argue that universal choice exists on a large scale in several countries now yielding evidence, some of which already exists in published studies. But the widely cited 1992 New Zealand reform was only public school choice, and with significant central government control of the choices. The restriction-laden, Dutch, Chilean, and Swedish option-demand programs only reveal the effects of vouchers when the state prescribes schooling practices in great detail (Gauri, 1998; Merrifield, 2008b). Even under those very limiting circumstances, Chilean and Swedish entrepreneurs produced a significant private school sector supply response without undermining the effectiveness of the shrinking public sector. Private subsidized, public, and private unsubsidized schools improved significantly (Gallego, 2002; Merrifield, 2005). Like Florida's McKay special education voucher, Columbia's targeted voucher (Angrist et al, 2006), and emerging Swedish school choice programs (Merrifield, 2005), Chile's experience indicates that even limited price de-control (allowing taxed, tuition co-payment[23]) of intensely regulated schools greatly affects voucher use. The EVP did not control the tuition price of Edgewood private schools, or discourage co-payment by reducing the voucher amount when parents wanted to apply voucher funds ('co-pay') to attend schools that charged more than the voucher amount.

In addition to their lack of autonomy, Chile's private schools typically suffer a funding disadvantage over their state-run competitors. Chile's local governments supplement public schools' voucher funding. Still, some noteworthy academic gains (Sapelli and Vial, 2006) resulted from private school entrepreneurs' ability to follow the Chilean Education Ministry's detailed, comprehensive rules more efficiently than their public sector rivals. Sapelli and Vial

(2006) addressed the analytical errors that led some others to reach different conclusions from the Chilean data. A more recent, but still unpublished Sapelli and Vial (2007) paper makes additional methodological refinements and finds even greater private school superiority.

So, again, the critical element of insight is perspective. The EVP offer was universal, unrestricted, and delivered a large dollar amount that families were free to top off (supplement or co-pay) with their own money to send their children to schools like Holy Cross High School that charged more than the voucher amount. But, the EVP's geographic scope and time frame was too narrow to significantly leverage school operator entrepreneurial initiative and test how/whether a large, unrestricted voucher program would change the menu of school choices, and how that would impact choices. The opportunity for children to mostly transfer among the choices and types of choices that existed within the existing system prior to the EVP prompted EISD improvements that may have started to fizzle with the expiration of the EVP. Not only is it a bit too early to be sure of fizzle, the shift from the TAAS to TAKS test may be obscuring the direction of underlying changes at EISD schools. We'll periodically update our key findings.

Conclusions

"American 15-year-olds are on par with students in Portugal and the Slovak Republic, rather than with students in countries like Canada, the Netherlands, Korea, and Australia that are more relevant competitors for service sector and high-value jobs. That signals the striking erosion of America's onetime leadership in education (*McKinsey and Company*, 2009 p. 7)." And education reform is a high priority in at least two of those countries, as it is in most of the world (Plank and Sykes, 2003). That April, 2009, statement about the plight of education in America has become all too familiar. Despite a decades-long reform frenzy following the 1983 'Nation at Risk' declaration, including large funding increases, higher formal standards, and high-stakes

testing, the measured outcomes of the U.S. K-12 system are little changed, and unmeasured outcomes like breadth of curriculum seem to have greatly deteriorated. Productivity is in sharp decline (Hoxby, 2004). "By one measure we get 60 percent less for our education dollars in terms of average test-score results than do other wealthy nations" (*McKinsey and Company*, 2009 p. 9).

The effects of the EVP significantly increase our confidence that a well-constructed school choice program is an important part of a K-12 transformation strategy that does not constitute 'hope triumphing over experience,' which means 'more-of-the-same-harder' with strategies that already have a very poor track record. Our EVP findings add weight to findings from the smaller, more restrictive, targeted programs that traditional public schools either do not suffer, or improve slightly. Since the EVP was larger within its area and less restrictive than previous school programs, it yielded seemingly larger effects, especially in terms of economic development effects that were not seen as likely noteworthy effects of the well-known voucher programs in Milwaukee and Cleveland. However, the EVP's competitive effects – changes in EISD performance – are also noteworthy, with large increases in graduation rates, 'exemplary' and 'recognized' schools, and faster growth rates in test scores.

As we would expect from a temporary program that had to throttle backward on voucher availability after six years, the EVP's effects were strongest in the early years of the program. Indeed, in the first few years, EISD leadership could not know the extent of their enrollment losses, or that the EVP would not continue beyond the initial ten year commitment. Mostly below the level of EISD School Board policymaking, the district seems to have reacted accordingly. And then the district policymakers appear to have relaxed some as enrollment stabilized at first, and even rose a bit, and then EISD enrollment resumed its gradual, pre-EVP decline despite the winding down of the EVP; perhaps because it was winding down.

The ‘community effects’ are the most noteworthy results of the EVP assessment. A large segment of the population wants private school choice – even within the severe limitations of the current menu of school choices – badly enough to quickly relocate, or pretend that they did. Increased business activity follows. A political jurisdiction interested in stimulating economic development, while also kicking their school system – public and private components combined – forward need look no further than a universal voucher program that offers a voucher amount large enough to nearly cover the tuition cost of most private schools, while avoiding price control by allowing families to supplement voucher funds with personal funds. Such a program requires no new taxes.

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Appendix A: Property Value Data Appraisal Districts report to the State of Texas

http://faculty.business.utsa.edu/jmerrifi/eisd/propval.xls

Appendix B: Basic School District Data from the Texas Education Agency's Annual Snapshot Reports.

http://faculty.business.utsa.edu/jmerrifi/eisd/fiscal.xls

Appendix C: Discipline Information from Texas' Public Education Information Management System (PEIMS)

http://faculty.business.utsa.edu/jmerrifi/eisd/discipline.xls

Appendix D: Graduation Rate Data and Calculations Based on PEIMS Data

http://faculty.business.utsa.edu/jmerrifi/eisd/graduated.xls

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I (Merrifield) also want to note with admiration and personal gratitude that the CEO Foundation officials that initiated this study chose me to lead this assessment of the EVP even though I had been a critic of the program. In my *The School Choice Wars* (Merrifield, 2001), I expressed delight with the prospect of changed lives, but said EVP was unlikely to be an insightful experiment. The admiration stems from CEO's willingness to entrust an evaluation of their $52.4 million investment to a critic; something very rare in a world where even judges' findings are often assumed to reflect some kind of permanent underlying bias; that people can't have make judgments and have opinions and also be objective scientists. Beyond the gratitude for not assuming that, I also appreciate the chance to assess the accuracy of my 2001 prediction. I have to confess that while my basic concern was on target – that the temporary nature of the EVP would significantly influence the effects – the effects were still significant and noteworthy, and that the verification and measurement of the effects of being temporary were important things to establish. In fact, the EVP was a very insightful experiment.

[1] CEO stands for Children's Educational Opportunity.
[2] The Edgewood district is on the near west side of San Antonio, Texas.
[3] CEO Horizon supplied the voucher counts, the private student count, and TEA (see footnote 6) supplied the EISD enrollment data.
[4] This is the link to the most recent annual report:
http://www.window.state.tx.us/schoolvalues/proptax/annrpt08/School_District_Data.xls
Appendix A contains the Tables that we created from those Annual Reports.
[5] See Merrifield (2004) for more discussion of the control group selection process.
http://www.cato.org/pubs/journal/cj23n3/cj23n3-11.pdf
[6] See: http://ritter.tea.state.tx.us/perfreport/snapshot/2008/district.srch.html. Appendix B contains our compilation of the critical data for EISD and the control districts.
[7] Author (JM) heard Supt. Munoz make the claim, but did not record the time/place/medium.
[8] 83% of total EISD revenue in 1997-98: http://www.tea.state.tx.us/perfreport/snapshot/98/index.html
[9] TEA's snapshot, see footnotes 6 and 8, provided all of the control variable data, except for Median Family Income, which we estimated from the growth rates of various income-related factors, and the single, 1999, Census observation for that number for school districts.
[10] The statistical significance levels are uniformly higher for the BCAD regressions, and the # of bedrooms is statistically significant.
[11] http://ritter.tea.state.tx.us/adhocrpt/Disciplinary_Data_Products/Disciplinary_Data_Products.html
[12] Looming EVP expiration prompted an October, 2007 letter. An official at a private school attended by a large number of voucher users said that an earlier EISD letter had urged voucher users to return for the 2007-08 year – before the EVP expiration – or risk refusal to transfer private school credit towards an EISD diploma.
[13] http://ritter.tea.state.tx.us/research/pdfs/dropcomp_district_supp_2006-07.pdf
[14] Lots of EISD Board turnover and 4-3 votes.
[15] She found that, "currently enacted [narrowly targeted] voucher and charter school programs disproportionately attract students who were performing badly in their regular schools."
[16] Merrifield (2008a) explains the political, equity, and management challenge reasons that limit the academic diversity possible within a traditional public school.
[17] One episode of intimidation surfaced at a private school interview. EISD issued a letter prior to the final EVP year urging students to return to EISD immediately or face a loss of transfer course credits.
[18] Drew Lindsay, "PepsiCo Backs Off Voucher Plan in Jersey City." *Education Week* (November 15, 1993): 3.
[19] Some foreign programs like the Chile and Sweden voucher programs are arguably large, but regulatory micro-management severely limited the evolution of a diverse menu of schooling options.
[20] March, 2003 e-mail communication.
[21] There is considerable controversy over whether tuition voucher programs are well-understood; either the small, escape-valve, 'charity voucher' versions, or the large unrestricted versions. An extensive survey found that 2/3 of the U.S. population had virtually no idea what a tuition voucher program was (Moe, 2001).
[22] Hess (2002) uses the "pick axe" and "bulldozer" metaphors throughout his book.
[23] Taxed co-payment means that families might have to pay, say $1000, to pay tuition that exceeds the value of the voucher by $800. The government gets the $200 difference.

Technical Appendix

The empirical model can be described as

$$y_{ist} = w_i'\beta_0 + C_{st} + u_{ist}, \tag{1}$$

where $s = 1, \cdots, S$, $t = 1, \cdots, T$, $i = 1, \cdots, N_{st}$ for each s and t, $y_{ist} = \ln(P_{ist})$, P_{ist} is the price of house unit i at school district s in year t, C_{st} are district-year effects, w_i are covariates that vary at the individual level, u_{ist} are unobserved random variables. There are $S(= 4)$ districts and $T(= 10)$ years in the sample. Given the district s and year t, there are in total N_{st} house units. The error terms u_{ist} is uncorrelated with w_i and C_{st}. It has zero mean and is uncorrelated with each other.

The individual level covariates w_i in our study include the following: number of bedrooms, number of full and half baths, number of garages, total square feet of dwelling, and acreage of lot. The district-year effects C_{st} can be modeled as

$$C_{st} = x_{st}'\beta_1 + \beta_2^s + v_{st}, \tag{2}$$

where x_{st} are covariates that vary at the district-year level with constant coefficients β_1, and v_{st} are unobserved random variables that are uncorrelated with u_{ist} and x_{st} and have zero mean. Note that β_2^s captures the district fixed effects (common over years). The covariates x_{st} can possibly include the voucher dummy, number of vouchers, number of single family houses sold, tax expenditure student, TASS/TAKS pass rate for all test taken, TASS/TAKS-Pass rate for Math test taken, ACT mean composite score, annual dropout rate, median household income, percentage of economically disadvantaged students, percentage of students tested, property value per student. Among the possible year-district covariates, the number of vouchers used each year in the Edgewood district can be regarded as a measure of degree of awareness of the program. The number of single family houses sold can be regarded as the market demand measure. The remaining variables can be categorized as school quality proxy and family income proxy.

Combine (1) and (2), we have

$$y_{ist} = w_i'\beta_0 + x_{st}'\beta_1 + \beta_2^s + \varepsilon_{ist}, \tag{3}$$

where $\varepsilon_{ist} = v_{st} + u_{ist}$. In general, we should expect clustering problem in the sense that $E(\varepsilon_{ist}\varepsilon_{jst}) = \sigma_v^2$ for all $i \neq j$. In this case, we may still use the standard ordinary least squares (OLS), subject to some adjustment for the estimated standard errors by following Moulton (1986).[1] As discussed in Donald and Lang (2007), usually Moulton's (1986)

[1]The adjustment by Moulton (1986) assumes that the variance of v_{st} is homogenous across districts. For heteroscedastic v_{st}, the adjustment follows from Liang and Zeger (1986). For our study, as we have only 4 districts, heteroscedasticity in v_{st} makes the estimation procedure untractable. Moreover, for each district-year, the number of observations is large, so homoscedasitcy is a natural assumption. Also note that recently Hansen (2007) addressed the issue of policy autocorrelation, which happens when $E(\varepsilon_{ist}\varepsilon_{js(t-k)}) \neq 0$ if v_{st} is serially correlated. Under policy autocorrelation, the adjustment can be made by various methods as considered in Bertrand et al. (2004). Hansen (2007) assumed an AR(p) structure for v_{st} and proposes a FGLS procedure based on the bias-corrected AR coefficients. As in Bertrand et al. (2004), Hansen's (2007) method also requires that S is sufficiently large. Moreover, if the true underlying autocorrelation is not an AR(p) process, then it is not clear how Hansen's (2007) will fare. Finally, given the relatively short time span ($T = 10$), the estimated AR(p) parameters might be too imprecise to be useful for bias correction.

adjustment needs the number of districts S to be big. In our sample, $S = 4$. So one may still question the reliability of Moulton's (1986) adjusted OLS standard error. On the other hand, Donald and Lang (2007) suggested that the efficient feasible generalized least squares estimator is numerically equivalent to a two-step estimation procedure by following Amemiya (1978). We follows this two-step approach. For fixed S and T, if v_{st} is normally distributed, then the t statistics should be distributed as Student t with $(ST - k)$ degrees of freedom, where k is the number of regressors in the collapsed district-year regression.

Among all the variables, we take natural logarithm to stabilize some of them (price, income, expenditure, property value, square feet). Also, we can try with different specifications for the voucher dummy, due to the likely time variance of the effect of the voucher program. For the two-step procedure, a usual "goodness of fit" statistic like the R^2 is not applicable and we do not report it.

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[2] Bertrand, M., Duflo, E., Mullainathan, S., 2004. How much should we trust differences-in-differences estimates? Quarterly Journal of Economics 119 (1), 249–275.

[3] Donald, S., Lang, K., 2007. Inference with differences in differences and other panel data. Review of Economics and Statistics 89(2), 221–233

[4] Hansen, C., 2007. Generalized least squares inference in panel and multilevel models with serial correlation and fixed effects. Journal of Econometrics 140, 670–694

[5] Liang, K.-Y., Zeger, S., 1986. Longitudinal data analysis using generalized linear models. Biometrika 73 (1), 13–22.

[6] Moulton, B.R., 1986. Random group effects and the precision of regression estimates. Journal of Econometrics 32 (3), 385–397.

Technical Appendix B: Econometric Methodology for the Test Score Analysis

This appendix provides the econometric information for the competitive effects portion of the study. In this section we discuss the parameters and stages estimated to retrieve the results presented in the main body of the report. Generally, we used the framework provided in Singer and Willett (2003), which discussed the most effective way to evaluate longitudinal data.

Most often in competitive effect studies, researchers collect a longitudinal dataset and use a fixed effects transformation to control for all time invariant, unobservable characteristics about a student or school. Such an approach, however, proves impossible in this particular situation because all traditional public schools in the Edgewood district (EISD) between 2003 and 2008 experienced voucher pressure. Put another way, vouchers threatened every EISD school for the entire span of the data, which means a fixed effects transformation would eliminate the voucher variable because it does not vary. Thus, a more complex methodology was necessary to address this issue. To that end, we employed a multi-level design that includes fixed and random effects.

This multi-level method is drawn from Singer and Willett (2003). The authors discuss the multi-level dimensions in terms of two stages. The first stage, or level 1, is called the individual growth model, which "represents the change we expect each member of the population to experience during the time period under study" (Singer & Willett, 2003 p. 49). The level 2 part of the model "codifies the relationship between interindividual [sic] differences in the change trajectories and time-invariant characteristics of the individual" (Singer & Willett, 2003 p. 57). In a sense, level 2 imposes fixed effects on the model.

Using the 2 stage model allows us to observe how voucher threatened schools and non-threatened schools differed at the beginning of the time period *and* over the course of the time period in question. Thus, the model employed tested the effect of the presence of the voucher

program on traditional public school test performance. Therefore, the level 1 equation of the model is:

$$TSS_{ij} = \pi_{0i} + \pi_{1i} Time + \varepsilon_{ij} \qquad 1$$

where TSS_{ij} is the by grade weighted average TAKS scaled score of school i at time j; π_{0i} is the intercept of the change trajectory for school i; π_{1i} is the slope of the change trajectory for school i and epsilon is an error term. Models A and B in the results section are derived from equation 1. Those level-1 models merely evaluate the TAKS scaled scores with and without time as a factor. Those models exclude the voucher and other covariate effects. Therefore, a level-2 model is needed to show *between* school variations.

The level-2 sub-model is therefore:

$$\pi_{01} = \gamma_{00} + \gamma_{01} V + \gamma_{02} X + \zeta_{0i} \qquad 2$$

$$\pi_{10} = \gamma_{10} + \gamma_{11} V + \gamma_{12} X + \zeta_{1i} \qquad 3$$

where the intercept π_{01} is equal to an intercept γ_{00} plus the slope on V, which is a dummy variable indicating the school's existence in a voucher pressured district plus vector X of additional control variables; the slope parameter (π_{10}) depends on an intercept and the slope on V and the vector of additional control variables also. Those equations were estimated simultaneously using STATA's xtmixed command. Per Singer and Willett's (2003) instruction, different models were evaluated by adding an additional control variable to the previous model. Therefore, we started with stage 1 estimation and added time. Then we added vouchers in the stage 2 model and added control variables in a step wise manner.

We are mainly interested in the coefficient γ_{11}, known as the level 2 slope for voucher schools; it represents the effect of the presence of voucher use in a district over time. A positive

and significant coefficient for γ_{11} indicates that voucher schools' academic performance grew at a greater rate than did the control district schools.

Using data from control schools outside of the EISD eliminates endogeneity issues that normally plague competitive effects studies. A tuition voucher is not available to users of the control schools, but they are available to residents of EISD. By choosing control schools and districts based on demographics, it is reasonable to believe that the only difference between the voucher district schools and non-voucher district schools is the availability of vouchers. To protect against any systematic differences among the groups of schools, however, I included the additional control variables concerning finances, staff, and demographics.

This method is most useful because it yields useful information concerning variance. As additional control variables are added to the model, variance analysis provides information on whether that model is better than the previous model. These variance estimates are similar to an adjusted R^2 in that they penalize for adding an additional variable that does not belong. These variance components also provide confidence intervals indicating whether the model overall is eliminating a significant amount of the variance.

Since the studies evaluating the early years did not use any econometric analysis, I employed two different methods in an attempt to quantify the gains identified by the early studies. The first method is the same as described above. The second method is more traditional in terms of other competitive effect studies. Because the data for the TAAS tests goes back to 1994, I collected the percent passage rates for all schools in Texas. Since the voucher went into effect in 1998-99, I coded all schools as zero prior to that date and the Edgewood schools as 1 after that date. Employing a fixed effects regression, which allows for the controlling of all time invariant characteristics of each school, yields a comparison of Edgewood schools *after* the

implementation of the program to those same schools *before* the program. Those regressions also used similar control variables concerning school characteristics such as enrollment, expenditures, and student demographics.

We employed those analysis tools to avoid the most common problem in competitive effects studies, endogeneity. Standard fixed effect approaches could not be used on the data in the last half of the voucher program, since all schools in the Edgewood district were threatened for the entire span of time. Therefore, we used a more sophisticated, two-stage model for the evaluation of the latter portion of the program.