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CLAREMONT McKENNA COLLEGE

THE CHARTER SCHOOL MOVEMENT:
THE IMPACT OF SCHOOL FORM ON PERFORMANCE

SUBMITTED TO

PROFESSOR HEATHER ANTECOL

AND

DEAN GREGORY HESS

BY

JEREMY WOLFF

FOR

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The Charter School Movement:

The Impact of School Form on Performance

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Abstract: Using data from the DataQuest and Ed-Data databases provided by the California Department of Education (2006-2012), this study assesses if charter schools provide a net benefit to students compared to non-charter schools. Further, it examines if charter management organizations improve the performance of charter schools. I find that charter schools have no net benefit across all grades. However, charter schools get significantly better performance on high school language arts tests. Minority and low-income students perform better at charter schools than traditional public schools, especially at the middle school level. Minorities in middle schools perform even better at CMOs than independent charter schools.

Key Words: Charter Schools, Charter Movement, Effect of Charter Schools
JEL Codes: I24, I25, I28

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1. Introduction

Low-income and minority students attain lower test scores compared to white students and students with higher family incomes (Reardon, [2011], Hemphill *et al.* [*2011*]). This achievement gap is caused by factors including parental income (Abbot *et al.* 2009), parental education (Davis-Kean, 2005), attendance (Gottfried, 2010), hours in class (Patall *et al.* (2011), teacher experience (Rice, 2003), student-teacher ratios (Mosteller, 1995), neighborhood poverty (Lacout *et al.* 2011), and factors associated with race (Hemphill *et al.* (2011). By seeing how test scores have changed for students of different races and income levels over time, we can see if the achievement gap has decreased. Over the last twenty years, the achievement gap due to race has not changed while the gap due to parental income has grown significantly (Yeung, 2008). Studies have found that income has an effect at least seven times greater than race (Abbott *et al.* (2009). Further, students from low-income families are less likely to obtain college diplomas than students from medium or high income families (Bailey, 2011). Students without a college education have a higher unemployment rate (Sabadish *et al.* 2012) and a lower annual salary (Bureau of Labor Statistics, 2013). Economists have found that the cost of the achievement gap is equal to ten percent of America's annual gross domestic product (Social Sector Office, 2009). The achievement gap has a significant impact on the quality of life for all Americans and is an important issue today.

In response to the growing achievement gap, education reformers have created new teaching models that seek to serve high minority and low income children (Finnegan

et al. 2004). These models emphasize changes in education administration and accountability to create schools which value responsibility, commitment, and leadership, for both students and teachers. One model is known as the "marketplace theory" (Molnar *et al* [2007], Bulkley *et al* [2011]). In this model, schools can experiment with new instructional strategies and parents can choose which school their children go to. Over time, only the best schools stay open (Allen, 2001). The accountability model is best exemplified by the No Child Left Behind Act of 2001. This law requires schools to make adequate yearly progress for all races, income levels, and other subcategories. Schools who do not meet standards lose funding or are shut down (Le Floch *et al* 2007). Schools have reacted to the marketplace and accountability models by increasing testing, lengthening the school day, reducing absenteeism, and improving teacher quality, among other strategies.

Charter schools have most readily adapted these new teaching models because they have greater flexibility and autonomy than traditional public schools (Finnigan, 2004). Charter schools are institutions that are publically funded through the school district, but have an independent board of directors. This allows charter schools to choose their own curriculum, hire their own teachers, and implement different policies than traditional public schools (TPS). Particularly, charter schools have unique teacher hiring, training, and development methods than TPS. However, charter schools must meet the accountability standards set by their chartering agencies. The first charter school was established in the U.S. in 1991, and in twenty years charter schools in the United States

have grown to 5000 schools (5 percent of all schools), comprised of 1.6 million students. In 2012, charter schools set a new growth record, adding 275,000 students in 381 schools.

Charter schools have seen particularly large growth in California. California hosts 1,063 of the nation's 5000 charter schools (CCSA, [2013], NCLS, [2013]). In 2012, California led the nation with a 17 percent growth rate, adding 81 schools. In the Los Angeles Unified School District (LAUSD), 33 new charter schools were added in 2012, bring enrollment up to 110,000 in 231 charter schools (20 percent of all schools in the district), and making the LAUSD the largest enrolling district of charter school students in the state.

Charter schools set out specifically to raise the achievement of high minority and low income students (Finnigan, [2004]). This is further evidenced by the synchronized growth in charter schools in California and the state's growing poverty rate and income gap. Indeed, California has the nation's highest poverty rate at 23 percent and has the third largest income gap in the country, where 40 percent of California's lowest wage earners make 11 percent of all income. Charter management organizations (CMOs) are institutions which replicate charter schools using a common mission and methodology. They are affiliated with half of LAUSD charter schools and directly operate 30 percent of them[1]. The biggest CMOs in LAUSD by enrollment are Green Dot, Aspire, Alliance, and KIPP. CMOs operate in low-income and high minority areas. [2]

[1] Statistic is the average for 2006 – 2011. In 2011, CMOs accounted for 43 percent of charter schools
[2] Kippla.org, laalliance.org, aspirepublicschools.org, greendot.org,

With the growing popularity of charter schools, it is important for policy-makers to know if charter schools are having a positive effect on the education system and closure of the achievement gap. So far, literature has been inconclusive on the overall charter effect. A number of studies have found that charter schools have no effect on student performance while a few smaller studies have found that charter schools have a positive impact in select school districts. All relevant studies have determined that charter schools have a larger variation in performance than public schools and that the nation's best and worst schools are charter schools. Literature on the charter effect for specific subgroups has concluded that charter schools have an overall benefit for minority and low income children. However, this effect is not consistent among all grades and subjects. Studies have been inconclusive on the overall effects of CMOs, but agree that they benefit minority and low income students. CMOs, like charters, can be very good or very bad.

While these studies have provided useful information for policy-makers, the continued growth of charter schools calls for further investigation to see how charter schools are performing as they have g ained more experience. From 2006 to 2011, the number of charter schools in the Los Angeles Unified School District (LAUSD) has nearly doubled, increasing from 96 to 189 schools. The most recent study regarding charter schools in California is the 2009 California CREDO study, which accounts for 687 of California's charter schools from 2005 – 2008. CREDO determined that charter experience was an important factor in charter effectiveness. By investigating the most updated data on a specific school district, I am able to investigate if increased experience

for charter schools has improved their effectiveness. I expand upon the current knowledge base by determining if CMOs have reduced the achievement gap more than TPS and charter schools as a whole. I look at every school in the LAUSD, allowing me to hold all regional factors constant. First, I determine if charter schools and TPS have a similar student body. Then, I investigate the differences in performance between charter schools and TPS at elementary, middle, and high school levels. Finally, I conduct the same analyst for independent charter school versus CMOs.

My approach has several benefits and shortcomings. By looking at a single school district, I hold constant all factors that vary by district. District policy, funding, and form are excluded as a factor which could create a variance in test results. Further, test scores are directly comparable as all schools in the LAUSD take the same statewide exams. School-level data allows me to investigate how differences between school form and school factors affect student outcomes.

Looking at test scores for school-level data has particular strengths and weaknesses. The main attribute of school-level test scores is that results indicate the overall effectiveness of a school, as opposed to a random distribution of students from multiple charter school or TPS. School-level data measures for the difference in tests scores from varying teacher qualifications, enrollment, student-makeup and class size. Most importantly, school-level data measures unobservable factors including school philosophy, attitudes, and policies, among others that are not considered when student-level data is aggregated. Past studies have found a nonexistent or very small charter effect

[Abdulkadiroglu, (2011), Angrist, (2011), and Hoxby, (2009)]. This study asks if, after distributing all charter students back into their schools, enough charter schools earn test scores extreme enough to be significantly different that TPS scores.

A shortcoming with school-level data is that scores cannot be attached to a particular subgroup. Each test score represents an outcome from a distribution of ethnicities, free lunch takers, and ELL students. This study cannot describe how a specific race, low-income students, or ELL do, but rather run a best-fit line between schools with varying percentages of each subgroup and the resulting test scores. Analysis is therefor in terms of percentage of ethnicity,[3] free lunch enrollment, and ELL relative to the entire school enrollment. Test scores show the result of a given composition of subgroups and not for a single subgroup. However, subgroup performance can be approximated by school performance as the data shows the marginal effect on test scores of increasing each subgroup by one percent. This is the slope of the line between test score versus subgroup as a percentage of total enrollments. This approximation is not important when considering the effects of charter schools versus TPS because subgroup is held constant, allowing the model to compare schools of identical subgroup percentages.

The final key difference between this study and other recent charter school studies is that I measure absolute test scores as opposed to score growth. Other studies have compared end of the year scores to beginning scores, where this study only looks at

[3] I look at results for each ten percent of a given race, FRLP, or ELL

spring data. Further, I include Annual Yearly Progress tests, which compares tests from the current year to prior years, specifically measuring for the gains each student makes over the course of the year. The benefit of absolute scores is that I can determine if charter schools earn different scores than TPS. However, the downside of the absolute scores is that they measure all gains the student made before the current academic year in addition to the yearly progress. Even if a school earns a higher absolute score, it may have a lower growth rate when compared to another school. However, by including the AYP scores, I better incorporate this growth measure. My results find larger z-scores than past studies. There are three possible reasons for this effect. First, school form in the LAUSD has a more significant effect on test scores than it does nationwide. Second, differences between absolute scores may be larger than differences between student growth rates. This condition occurs when more of the effects of charter schools have affected students in past years versus current years. The potential problems with this characteristic are addressed in the following paragraph. Third, and most plausibly, because my study looks at only one school district, the smaller sample size causes for each school score to have a greater effect on the overall mean. Consequentially, the larger z-scores include larger standard error measures in proportion to those of prior studies.

By not using growth measures, I cannot eliminate the effects of past student performance. That is, any gains in my study could be the result of having more motivated students and not better schools. While my study does not completely solve this problem, it is mitigated by three measures. First, TPS in LAUSD attract as many motivated students as charter schools. LAUSD TPS hosts 173 magnet and gifted programs, which

attract the top students in the district (LAUSD, 2013). There is no indication that charter schools attract more motivated students than TPS. Indeed, the mission of many charter schools is to target high need children. Additionally, both forms of schools enroll 81 - 83 percent minority students and 75 percent free or reduced priced lunch eligible students. It is unlikely that motivated and non-motivated students would be equally distributed by minority and income when minority and income are correlated with lower test scores. If motivation was different between charter and TPS, one would expect to see less minority and less low-income students at charter schools. Indeed, recent studies have found that white and upper income families are more likely to consider alternative school options than minority and low income families (Booker, 2005). These families have not trended towards charter schools (Zimmer, [2009], Tuttle [2010]). Finally, charter schools in California are required to hold lotteries for admission if there is excess demand. The waiting list for charter schools in LAUSD is 10,000 students, or 1.5 percent of the student population (CCSA, 2013). Additionally, many TPS have a waiting list. While waiting lists are an indicator of parent involvement, waiting lists have not been shown to be correlated with student motivation. The biggest factor for lottery and waiting list applications are school test scores, and not parent motivation (VanderHoff, 2008). While neither measure eliminates the motivation factor, it is partially mitigated by the inability of all motivated, white, or wealthy students to attend charters. The results of my study include any differences in motivation students had when entering charter school. In regards to previous research, I believe any differences are negligible. However, further

research is needed to determine if any motivational differences exist between charter and TPS students.

I find that there is no charter effect. However, minority students do significantly better in middle school charters than at TPS. Most of these gains are in language arts. CMOs perform much stronger for Hispanic students than independent charter schools at the middle school level. I go on to review the relevant literature on charter school performance. Then, I describe my research methodology. I look at how charter schools compare to TPS. Finally, I see how CMOs compare to independent charter schools.

2. Literature Review

The introduction of charter schools have led interest to academics about the effectiveness of the strategies that charter schools employ. Specifically, a number of recent studies (CREDO, [2009], Hoxby, [2009], Zimmer *et al* [2009], Tuttle *et al* [2010]) have investigated the different effects of charter schools and TPS on student performance. Most of these studies have found that there is no difference on student performance between charter schools and TPS as a whole, but charter schools have a positive effect on performance for students in poverty and students learning English as a second language (also called English language learners, or ELL). The studies have also found that charters perform stronger as they have more years of experience. These past studies have had two forms: they have either matched a charter student to a TPS twin, or

they looked at the effect of students who enrolled in lotteries to attend charter schools and compared those that were accepted and rejected.

Three recent studies have found that charter schools have no effect at increasing overall student performance. The most comprehensive study (CREDO, 2009) pools over 1.7 million records from 2400 charter schools in 15 states and the District of Columbia, accounting for 70 percent of the nation's charter school students. The study compares test scores between fall 2007 and spring 2008 for charter and TPS twins, who are matched based on ELL, income, and other demographic variables. This study conducts an ordinary least squares regression, separating math and language arts, by comparing charter school students to their TPS twins. The study discovers that charter school students trail their traditional school peers' growth by .01 standard deviations in language arts and .03 standard deviations and math, though 17 percent of the charter schools in the study perform above the TPS mean and 37 percent below it. Further, the study concludes that students in poverty at charter schools perform .01 standard deviations better than TPS students in poverty. The study notes that students in their first year at the charter school perform .06 to .09 standard deviations behind TPS students, but students in their second or third year at the charter school perform no better or up to .03 standard deviations better than their TPS twins. For California students, the study finds that all demographic subgroups perform the same as the aggregate, but the overall effect of charter schools is to benefit charter schools by .01 standard deviations in language arts but to harm them in .03 standard deviations in math, showing a net charter school disadvantage. While the

2009 CREDO study does have a large sample size, its short-term period makes a definite conclusion regarding the effect of charter schools impossible.

The CREDO results were supported by a 2009 study conducted using data from 1997 – 2007 in eight American cities (Zimmer, 2009). This study also finds that charter schools in their first year perform below those that are more experienced. Zimmer uses the lottery system, giving the study strong internal validity. Charter schools in their first year of performance do much worse than TPS. Students attending a charter high school enjoy substantial increases in graduation rates. Further, charter schools have similar student test scores as public schools for transferring students, suggesting that charter schools receive the same quality students as public schools.

A third study also concludes that charter schools have no overall effect on student performance (Gleason, 2010). This study followed 2,330 students across 36 middle schools in fifteen states. It investigates the impact of charter schools on students who won lotteries and lost them over two years. The study finds that charter schools have no effect on improving student performance and that there is a large deviation in results between each school (a standard deviation of .36). However, the study echoes the 2009 CREDO report, finding that low income students have significantly higher performance in math at charter schools. Gleason finds that charter schools are significantly smaller and have longer school days. The three studies above share a common conclusion: charter schools have no effect on overall student performance. However, the studies also conclude that minority, low income, and ELL students perform better at charter schools. They find that

charter schools have a very large range of effectiveness and that the first year a charter school is in operation, it performs significantly worse than TPS schools. But as charter schools age, their performance improves.

One study finds that a CMO can have a positive effect on student performance (Tuttle, 2010). This longitudinal study follows students entering 22 *Knowledge is Power Program* (KIPP) managed charter schools and their nearby TPS middle schools over five years. Like Zimmer, Tuttle extensively analyzes the descriptive differences between KIPP and TPS students. While Tuttle finds KIPP students are more likely to be a minority and on the free-lunch program, there is no systematical effect on entering test scores. However, KIPP students go on to have higher grade repetition rates, meaning they stay in middle school longer than their TPS twins. The study finds that KIPP students have a positive advantage in mathematics and language arts. Further, these higher scores were often substantial and grew as the school became more experienced. These results are opposite to the three larger studies conducted nation-wide. This implies that KIPP schools are more effective than independent charter schools. Indeed, the KIPP schools produced overall better student performance than their TPS neighbors, after controlling for student characteristics.

Another study confirmed that charter schools can have a positive effect on student performance in certain situations (Hoxby, 2009). Hoxby investigates charter schools in New York City. The study includes data from 2000-2008, covering 93 percent of NYC's charter school students. Nearly 100 percent of the students who attend charter schools in

NYC only do so after participating in a random lottery. Hoxby looks at the educational outcomes of lottery winners versus lottery losers over eight school years. The study finds that a child who attends a charter school for eight years closes 86 percent of the achievement gap in math and 66 percent of the achievement gap in language arts versus almost 0 percent for a student who stays in a TPS. These gains represent faster increases in scores for minority and low income students in charter schools versus students not at these socio-economical disadvantages. These results are similar to the gains achieved in KIPP as well as

Longitudinal lottery studies in Boston from 2001 - 2008 (Abdulkadiroglu, 2011) and in all of Massachusetts from 2002 – 2009 (Angrist, 2011) found significant gains in middle and high school scores math scores, but one study found no effect in language arts scores while the other found significant gains. The Massachusetts study found that most of the gains were attributable to urban schools. While the KIPP, New York, and Massachusetts studies found charter schools to have an overall positive effect on student performance, the three nationwide studies found charter schools to perform about equal to TPS. This difference may be explained by differences in regional charter performance, although the difference in form and purpose of each study does not make them directly comparable. However, all the studies make it clear that overall, minority and low income students perform better in charter schools than TPS, although it may not be true for all grade levels or subjects. It is clear that charter schools have some impact on improving scores for minority and low income students. More research is needed to determine which grade levels and subjects charter schools best close the achievement gap. This will help

policy-makers and educators learn charter school strengths and weaknesses so they can adjust policy and teaching methods accordingly.

Researchers have also investigated the difference between CMOs and independent charter schools to see if CMOs possess attributes that are more effective than independent charter schools. In January 2013, CREDO issued a report on charter school growth and replication which looked at 1372 schools operated by 167 CMOs and TPS in the same neighborhoods (Woodworth, 2013). The study found that CMOs have no net positive effect on student performance, but the range of results is very large. 37 percent of CMOs outperformed TPS in math, compared to only 17 percent of all charter schools, a large deviation also found in a recent five-city study (Ryan, 2013). The CREDO report also found that socioeconomically disadvantaged students fared much better at CMOs than in independent charter schools. CMOs have some attribute that is more beneficial to minority and low income students than independent public schools. More research is needed to see which grades and subjects CMOs most effectively close the achievement gap.

Researchers have looked to see how charter schools qualitatively differ from CMOs (Lake *et* al 2012). Recent studies have focused on what aspects of charter schools cause them to produce better results for low income and minority students than TPS (Woodworth, 2013). A survey of 100 California charter school principals and 40 percent of their teacher found that teachers at charter schools are mission driven and their principals work closely with parents (Riley, 2000). CMOs are especially mission driven,

creating high expectations for student behavior and establishing adults as positive role models. A recent study (Lake *et* al 2012) found that four CMOs (ICEF, KIPP, Uncommon Schools, and YES) achieved particularly strong results by creating a focused learning environment, encouraging consistency across classrooms, asking parents to support school actions, having flexibility to implement behavior policy, and emphasizing teacher training. CMOs such as Uncommon Schools, Yes, KIPP, and Aspire provide staff with frequent and intensive coaching (Lake *et al.* 2012). At CMOs, the most important factor in making a job offer was assessed commitment to mission and the biggest factor determining pay was administration observations. Teachers are found from a variety of sources including Teach for America and teacher residency programs, in addition to traditional education programs and local school districts (DeArmond *et al.* 2012). A 2006 study found that most charter schools in California depend a lot on the school district and only 11 percent of schools were highly independent. Teachers at these highly independent schools had an average experience of 6.6 years fewer than teachers at TPSs, reinforcing the priority of mission over experience (Pérez, 2006). The 2013 CREDO Report on charter school replication (CREDO), 2013) best summarizes this information. It found that CMOs focusing on underserved students can best capture their growth potential. Further, consistent replication is possible, but one third of CMOs do it poorly. Finally, it found that high early performance is crucial in a school run by a CMOs success (CREDO, 2013).

All the prior research on charter schools leads to the same conclusion: charters can be great or terrible. Charter schools have larger standard deviations of results than

public schools, but on average, preform the same. Charter schools above the mean should be replicated and those below should be closed. Charter schools have a positive effect on low income, ELL, and minority students. Why do charter schools benefit this pool of students? There must be some differences in the operation of charter schools than public schools that help disadvantaged children. These differences could include the training of teachers, the curriculum of the schools, teacher salaries, school facilities, time spent in class, and other factors. Recent research has shown that CMOs are particularly mission driven. By investigating the different results between CMOs and independent charter schools, I can unravel why CMOs have a particularly strong ability to close the achievement gap.

3. Data

I use data from the California Department of Education's DataQuest database and the Ed-Data database, a partnership between the CDE, EdSource, and the Fiscal Crisis and Management Assistance Team. Dataquest offers data at the school level for the enrollment, staffing, demographic factors, as well California Star Testing results. Ed-data provides the academic performance index, adequate yearly progress reports, and additional school and demographic information. By aggregating the two databases, I create a comprehensive dataset covering the five school years from 2006-2007 through 2010-2011. I add information from the California Charter Schools Association to describe if the school is a CMO or not. The data includes 4,281 observations of all public

elementary, middle, and high schools in the Los Angeles Unified School District (LAUSD). By focusing on one district, the study gains internal validity as school district is removed as a factor that could affect test scores. This implies that all schools should have similar public, cultural, and regional influences. Most importantly, all the information is attained in a constant manner and the tests are identical, making results directly comparable.

I gauge school performance based on school data, is the aggregate of student test scores. Performance measures include the academic performance index score (API) and STAR testing results for math and language arts, which determine the percent of students basic and above or proficient and above. Passing the basic standard shows that a student has a limited and rudimentary understanding of the topic while passing the proficient standard means that s student has a solid and competent understanding of the content area. The data includes a metric called the adequate yearly progress score (AYP) in mathematics and language arts, which computes each student's progress based on the STAR test scores from year to year. I create z-scores in order to interpret results more easily and better compare results across grades. I divide the students into elementary, middle, and high school categories. I look at the graduation and dropout rates at the high schools. I assess student performance based on if the school is a charter or not. I also investigate the effect of the percentage of teachers at each school with a completed teaching credential. I look at the average class size and I assess the effect of administrators, service staff, and teacher ratios. Administrators include office staff and principals, service staff includes nurses, psychologists, and other pupil service providers,

and teachers include lead teachers and assistant teachers in the classrooms. The data also provides information on the percentage of students at the school who receive free or reduced price lunches,[4,5] percentage of black, Hispanic, Asian and white ethnicities[6], the percentage of minority students, school enrollment, percentage of ELL, percentage of students who are proficient in fluent English, and which schools are year-round. Charter schools which have a management provider are delegated as CMOs. The data covers the five school years from 2006-2007 through 2010-2011.

3.1 Overview

Charter schools have experienced significant growth in the five years of this study. From 2006 – 20011, charter schools have grown from 96 schools to 189 schools, rising from 14 percent of all public schools to 26 percent (table 1). This compares to creation of only 21 new non-charter schools. The growth in charter schools is fairly distributed between elementary, middle, and high schools (table 3). In the same time, CMOs have grown from 19 schools to 81 schools, shifting from 20 percent of charters to 41 percent (table 2). 81 of the 93 new charter schools opened in the last five years are CMOs. These CMOs are managed by companies including Green Dot, Aspire, Alliance,

[4] A family of three qualifies if they make less than $42,643 per year, a family of four at $42,643, and a family of five at $49,969 (LAUSD, 2013) http://notebook.lausd.net/pls/ptl/docs/PAGE/CA_LAUSD/FLDR_LAUSD_NEWS/FLDR_ANNOUNCEMENTS/NR-NSLP2012DS_0.PDF

[5] The medium income in California from 2007-2011 was $61,632 for a family of 2.91 persons (US Census Bureau, 2013) http://quickfacts.census.gov/qfd/states/06000.html

[6] White students include other categories, such as Native Americans

KIPP, and Magnolia Public Schools. These five organizations account for half of all CMOs in the LAUSD.

Charter schools have quite a different student and teacher make-up than TPS. Enrollment in charter schools is 50 percent lower than TPS and charter schools are more likely to be year round. Hispanic students makeup 60 percent of charter schools and 62 percent of TPS, while African American students makeup 21 percent of charter schools and 12 percent of TPS (table 4). Taken together, both charter schools and TPS host 81 – 83 percent Hispanic or African American students. There are slightly more Asian students at TPS and slightly more white students at charter schools (table 4). Both charter schools and TPS have 75 percent of children on the free or reduced priced lunch program (FRPL). Students at TPS are 9 percent more likely to be learning English as a second language, corresponding with the Hispanic student distribution (table 4).

Teachers at charter schools are far less likely to be credentialed than teacher at TPS. Fully credentialed teachers at charter schools account for only 71 percent of teachers while teachers at TPS account for 92 percent of educators (table 4). Further, charter schools have larger pupil/teacher ratios, coming in at 21 students per teacher compared to just 20 students per teacher at TPS. This pattern is consistent with the service and administrator ratios. Charter schools have less service and administrator staff members, with ratios of 173 and 93 students per staff respectively. TPS have ratios of only 94 and 65 students per staff member respectively. Charter schools have more fluent English proficient speakers (FEP), tallying 24 percent of students versus 21 percent for

TPS. Only students who have learned English as a second language and are proficient English speakers can be classified in this category (table four). These findings are consistent with past studies regarding California charter schools (CREDO, [2009], Zimmer, [2009]).

3.2 The Achievement Gap

A Pearson's correlation test reveals that much of test scores can be explained by minority students, ELL, and students on the reduced-price lunch program. Correlations between test scores and race, enrollment, income, credentialed teachers, and the pupil/teacher ratio show that these factors play a significantly roll in predicting student outcomes. Hispanic and black students correspond with lower test scores, while Hispanic students have almost twice the relationship with lower test scores than black students do. Asian students correspond with increased tests scores to the same extent that Hispanic students have negative scores. Low income students correspond with significantly lower scores.[7] Higher enrollment also correlates to negative scores. Credentialed teachers correspond to significantly higher scores. While a higher pupil/teacher ratio correlates to higher scores on the Academic Performance Index (API) and language arts scores, it has a far weaker relationship with math scores (table 5).

This school-level student data shows that charter schools can expect improved test scores compared to TPS because they have less Hispanic and ELL students. Their lower

[7] Low income students are approximated by students on the FRPL program

enrollment should also cause for higher scores. However, the increased number of black students and lower amount of credentialed teachers should reduce test scores. The counter-effects of more white students but less Asian students could increase or decrease test scores. This study holds all student characteristics and school traits constant.

3.3 Regression Method

I look at all schools in the LAUSD from 2006 – 2011, considering school-level data and test scores. I run a multiple OLS regression which includes a vector of school control as well as interaction terms for charter schools and race, income, and ELL:

$$Y_{ST} = \alpha + \beta_1 Charter_{ST} + \beta_2 Race^{8}_{ST} + \beta_3 Charter*Hisp_{ST} + \beta_4 Charter*Black_{ST} + \beta_5 Charter*Asian_{ST} + \beta_6 Freelunch_{ST} + \beta_7 Charter*Freelunch_{ST} + \beta_8 ELL_{ST} + \beta_9 Charter*ELL_{ST} + \boldsymbol{\delta}\, \mathbf{X^{9}_{ST}} + \delta\, \mathrm{Year_S} + \varepsilon_{ST} \quad (1)$$

Y is the z-score for either the California Star Test (CST) in language arts or math, measured as a percentage of students enrolled either basic or proficient, (for now on, language arts and math), the z-score for the Academic Performance Index, which is measured on a point scale from 1 – 1000, and the Adequate Yearly Progress metric, which is a percentage of students who made progress on par with state determined levels. Charter is a binary variable where 0 indicates non-charter and race is divided into the percentage of students who are Hispanic, African American, or Asian. White students are

[8] Where $\beta_2 Race^{8}_{ST} = \beta_1 Hispanic_{ST} + \beta_2 Black_{ST} + \beta_3 Asian_{ST}$

[9] Where X is a vector of school controls (enrollment, FEP, REFEP, teacher/student ratio, and year round)

considered in the constant term. Freelunch is the percentage of students on the FRPL program and ELL is the percentage of students learning English as a second language, but who are not yet fluent. Year is a control for each school year. X is a vector for school controls including enrollment, fluent English proficient students, the pupil/teacher ratio, and seasonality of schools. Interactions between charter schools and race, Freelunch, and ELL are included to find the difference between differences of charter and non-charter subgroups. The control group is TPS with a population that is 100 percent white. As such, the coefficient for charter does not explain the charter effect; it tells us the charter effect for a school of 100 percent white students. The constant term is the expected test score for a non-charter 100 percent white school. The coefficients for race are expected test scores for every one percent increase in that race of non-charter students. The coefficients for the interactions between charter and race are the differences in test scores between charter and non-charter students for every increase in one percent of that race. The expected test scores for a charter student of a given race is the sum of the coefficients for both race and the interaction term.

To better see the charter effect, I adjust the model by shifting the zero point for each race by subtracting the mean value of race from every observation. The adjusted regression is:

$$Y_{ST} = \alpha + \beta_1 Charter_{ST} + \beta_2 Race\ Mean^{10}{}_{ST} + \beta_3\, Charter*Hisp\ Mean_{ST} + \beta_4 Charter*Black\ Mean_{ST} + \beta_5 Charter*Asian\ Mean_{ST} + \quad (2)$$

[10] Where $\beta_2 Race^{10}{}_{ST} = \beta_1 Hispanic\ Mean_{ST} + \beta_2 Black\ Mean_{ST} + \beta_3 Asian\ Mean_{ST}$

$$\beta_6 Freelunch_{ST} + \beta_7 Charter*Freelunch_{ST} + \beta_8 ELL_{ST} + \beta_9 Charter*ELL_{ST} + \boldsymbol{\delta}\, \mathbf{X}^{11}_{\mathbf{ST}} + \delta\ \text{Year}_S + \varepsilon_{ST} \quad (3)$$

The adjustment does not alter the coefficients for race or the interaction terms. However, the coefficient for charter and the constant change. Instead of the constant describing test scores for a non-charter school of 100 percent white students, it now expresses the value for non-charter schools when every race is at its mean. This describes a school with a 70 percent Hispanic, 14 percent white and other, 13 percent African American, and 3 percent Asian population. However, only one third of schools are within 20 percent of the mean racial distribution. Inputting the mean racial distribution offers evidence of the overall charter effect, but I am more interested in looking at interaction effect for each race with charter schools.[12]

3.4 The Charter Effect

The regression reveals that, holding constant other school factors, a charter school with the mean distribution of races in the LAUSD performs .583 standard deviations better on the Academic Performance Index than a TPS (table 7). This results in a 60 point increase to an average score of 750 points, an improvement of 8 percent and significant at the .01 level. The advantage is not divided equally between language arts and math. Charter schools outperform TPS by between .449 and .359 standard deviations on the CST language arts and math basic tests (figure 1). They have no different results

[11] Where X is a vector of school controls (enrollment, FEP, REFEP, teacher/student ratio, and year round)

on the AYP math assessment or the CST math proficiency test. It makes since that reading results are greater than math results because this outcome is consistent with past studies. The API results fall in-between the reading and language arts gains because this test consists of both language arts and math components (figure 1).

These overall gains for charter schools are present for several reasons. First, that charter schools are different enough from TPS to produce stronger results. The *2013 CREDO study* (Woodworth *et al* 2013) finds that charter schools have higher expectations of students and teachers than TPS. These expectations are not observed and can be seen at the school level, but have no measurable independent variable. These gains of 6 – 8 percent on language arts test scores are meaningful. They echo the *CREDO 2009* findings that charter schools have stronger effects in language arts than mathematics. While Credo found a slight underperformance of charter schools in mathematics, I find a slight positive performance. This difference can be accounted for the difference in time period, the difference in scope,[13] and differences in school form. While my findings show higher standard deviations of results between charters and non-charters than past studies, this difference is caused by gains of looking at identical and directly comparable tests, differences between absolute and growth scores, and differences in sample size. In many cases, a large effect can be a cause for concern. The large result is not unreasonable here because the increase in scores is similar across all language arts tests, giving it internal validity. However, the large standard error limits the value of these findings on an exact

[13] CREDO looks at 2006 – 2008 while I look at 2006 – 2011. CREDO include schools throughout California while I focus on the LAUSD.

point basis. We can only conclude that charter schools perform stronger than TPS in language arts, and to a lesser extent, mathematics. My findings do not invalidate the CREDO findings because charter schools in LAUSD have changed considerably in the last three years in number and form. In this time, charter schools grew by 4 percent while CMOs as a percentage of charters grew by 15 percent. The 701 charters around since 2008 have become more experienced. As charters gain experience, their test results have improved (Hoxby, [2009], Zimmer *et al* [2009], Tuttle *et al* [2010]). Also, as charter schools have grown and become more dominated by managing organizations, they have become more effective. Positive results are investigated and teachers are trained on the attributes which generate those results. Indeed, the growth of charter schools in the LAUSD is one of the reasons continuous research is needed on charter schools. Moderate improvement in performance over three years is expected based on current literature.

Interactions between charter schools and Hispanics, African Americans, and ELL are significant (figures 1-6). On the API, a charter schools performs .08 standard deviations better for every ten percent of the enrollment that is Hispanic students compared to TPS (figure 2). However, charter schools reduce performance by .05 standard deviations for every ten percent of the enrollment of ELL students (figure 6). The regression creates this opposition to predict that charter schools produce a net benefit to students who are Hispanic but not ELL. As most ELL students are Hispanic, the ELL shortcoming directly reduces charter school gains. However, a typical school has 70 percent Hispanic students, but only 20 percent ELL, so charter schools still help improve Hispanic performance overall. When we consider the average Hispanic and ELL

enrollment at a LAUSD school, charter schools provide a net advantage of .448 standard deviations over TPS, or 6 percent. Further, a school with many Hispanic students who are not ELL would earn significantly higher test scores at a charter school. ELL students at charter schools did not underperform their counterparts at TPS on CST math basic or proficiency tests. Charter schools also outperform TPS by .04 standard deviations for every ten percent enrollment by African American students (figure 4). These gains for Hispanic and black students are echoed on the CST tests for both language arts and mathematics, but not on the AYP assessment for math, and only on the AYP for Hispanics in language arts. This suggests that minorities receive better scores at charter schools, but their gains are not growing. Compared to the control groups, schools performed .11 standard deviations worst for every 10 percent enrollment of Hispanic students at TPS but only .03 standard deviations worst for every 10 percent of Hispanic enrollment at charter schools. Overall, charter schools outperform TPSs with the same minority makeup.

Charter schools have overall gains in language arts, twice to the extent of mathematics. Hispanic and African American students perform significantly better at charter schools. A flaw with this overview is that different school levels are merged together, and elementary schools perform significantly better than middle schools and high schools. As such, I go on to break up the schools by elementary, middle, and high school levels.

3.5 Elementary Schools

Charter schools underperform TPS on CST language art and math testing. AYP results show no significant differences between the two school types. Hispanic students perform no differently at charter schools versus TPS but schools with African Americans perform significantly better if set up as charter schools. Charter schools earned language art scores .05 standard deviations higher for every 10 percent African American enrollment than TPS on CST language art tests, and .04 standard deviations higher on CST math tests (figure 8). Average black enrollment is 13 percent. Charter schools outperformed TPS by an average of .04 standard deviations for every 10 percent of low income students on the API, CST LA basic, and CST math tests (figure 9). These gains were also seen by ELL students, where charters outperformed TPS on the same tests by an average of .03 standard deviations for every 10 percent ELL of enrollment (figure 12). There was no difference between charter and TPS on the AYP language arts and math assessments. In elementary school, only African American, low income, and ELL students receive a benefit from charter schools. The results are seen on CST testing in both language arts and math, but not on the AYP exams (figures 7 -13).

3.6 Middle Schools

Middle schools saw no overall effect from charter schools. However, Hispanic and black students had staggering gains. The results replicates previous findings that charter schools have a stronger effect for minorities than white students. Charter schools outperformed TPS by .13 standard deviations for every ten percent of students of *both*

Hispanic and African American races on the API, and .11, .20, and .16 standard deviations on the AYP LA, CST LA basic, and CST LA proficient tests respectively (figures 14 – 17). Charters outperformed TPS by .14 standard deviations for every ten percent Hispanic students on the CST math basic and proficiency tests. Charters outperformed TPS by .22 and .16 standard deviations for every ten percent black students on the CST math basic and proficient tests respectively. Low-income students had gains at charter schools on the API and all three measures of math, but no gains on any measures of language arts. Average gains on the math tests were .09 standard deviations for every ten percent low-income enrollment in the school. ELL had a small but negative experience at charter schools on math tests, lowering AYP math and CST math proficiency scores compared to TPS by .14 and .07 standard deviations for every ten percent of enrollment. From elementary to middle school, African American and low income students extended their gains at charter schools, while ELL reversed the trend and Hispanic students went from no benefits to significant benefits at charter schools. These findings further the conclusion that charter schools have little benefit for white students, but minorities and low income students perform significantly better compared to similar student make-ups at TPS (figures 14 - 17).

3.7 High Schools

High schools see a charter effect on the API scores and the AYP language arts metric (figure 18). However, there is no charter advantage in mathematics. African

Americans underperformed at charter schools on the CST math proficiency test by .09 standard deviations for every ten percent enrollment (figure 20). This is a reversal of trends from middle school. One explanation is that charter high schools differ significantly from middle schools in how minorities are taught math. Charter schools are significantly smaller so offer a smaller breadth of courses. However, further research is needed to see why African Americans do better in middle school charters than high school ones. Asians also underperformed at charter schools on this test by .03 standard deviations for every ten percent enrolled (figure 20). They had no difference on any other metric. Hispanics, alternatively, had significant gains at charter schools on the API and language arts tests. ELL underperformed at charter schools by .11 standard deviations on the AYP math test for every ten percent enrolled (figure 19). While the high school results are mixed, Hispanics continue to perform better at charter schools while black, Asian, and ELL students underperformed. Low-income students performed the same at charter schools and TPS.

These results show that the overall charter effect is inconclusive. While its finds that charters perform .538 standard deviations better overall on the API test, this finding is aggregate of underperformance in elementary school, indifference in middle school, and over-performance in high school. Charter schools underperform on elementary API and language arts tests but over-perform on high school language arts tests. Charter schools underperform on elementary math tests and saw no differences compared to TPS on middle school or high school math tests. After investigating different grade levels, the aggregate .538 gain for charters does not acutely describe the charter effect. These results

also conclude that charter schools differently than TPS, on average. However, by breaking up the students into subgroups, charter performance becomes more evident (figure 20).

Hispanic students have significant benefits in language arts at middle and high schools, and in mathematics in middle schools. African Americans perform significantly better on both language arts and math tests in elementary and middle school charters. While African Americans perform no worst on language arts in high school charters, they underperform in math. Over all grades, both minorities had consistently better relative effects from charter schools in language arts versus mathematics. These results conclude that minorities have significant benefits from charter schools in language arts. The charter school effect on math is much smaller. These results point to a clear middle school blowout period for minorities.

4. CMOs

From 2006 – 2011, CMOs managed between 20 percent and 43 percent of all charter schools in the LAUSD. I alter the regression to see if CMOs differ from independent charter schools:

$$Y_{ST} = \alpha + \beta_1 CMO_{ST} + \beta_2 Race^{14}{}_{ST} + \beta_3 CMO*Hisp_{ST} + \beta_4 CMO*Black_{ST} + \beta_5 CMO*Asian_{ST} + \beta_6 Freelunch_{ST} + \beta_7 CMO*Freelunch_{ST} + \beta_8 ELL_{ST} + \beta_9 CMO*ELL_{ST} + \boldsymbol{\delta}\, \mathbf{X}^{15}{}_{ST} + \delta\ Year_S + \varepsilon_{ST}$$ [16]

Overall, CMOs are no different than independent charter schools table 11). Hispanic students perform significantly better at CMOs, but ELL under-perform. The average gain for every 10 percent Hispanic enrollment is .11 standard deviations in language arts and .12 standard deviations is mathematics (figure 21 – 22). CMOs with 10 percent ELL students underperform .12 standard deviations in language arts and .14 standard deviations in math (figure 23 – 24). The average Hispanic population at a charter school is 60 percent while only 22 percent of all students are ELL. CMOs have significantly more Hispanic students than independent charters, recording 67 percent on average versus the 57 percent average in independent charters. There is no difference in the overall percentage of ELL in either school form. However, less Hispanic students are ELL at CMOs than at independent charters. Consequentially, charters see a net benefit from an uptick in Hispanic enrollment. This analysis seeks to determine what portion of the charter school benefits and shortcomings is attributable to CMOs at each grade level.

4.1 Elementary Schools

Elementary students at CMOs perform no differently than at independent charters in either math or language arts. Further, all subgroups perform the same. The only

[14] Where $\beta_2 Race^{14}{}_{ST} = \beta_1 Hispanic_{ST} + \beta_2 Black_{ST} + \beta_3 Asian_{ST}$

[15] Where X is a vector of school controls (enrollment, FEP, REFEP, teacher/student ratio, and year round)

[16] I use $Y_{ST} = \alpha + \beta_1 CMO_{ST} + \beta_2 Race\ Mean^{16}{}_{ST} + \beta_3 CMO*Hisp\ Mean_{ST} + \beta_4 CMO*Black\ Mean_{ST} + \beta_5 CMO*Asian\ Mean_{ST} + \beta_6 Freelunch_{ST} + \beta_7 CMO*Freelunch_{ST} + \beta_8 ELL_{ST} + \beta_9 CMO*ELL_{ST} + \delta\ X^{16}{}_{ST} + \delta\ Year_S + \varepsilon_{ST}$ to find the CMO effect

significant effect of CMOs is to hurt ELL performance by .10 standard deviations on the CST language arts proficiency test for every 10 percent of ELL enrollment (figure 25). CMOs only manage 15 percent of charter elementary schools compared to 30 percent for all other grade levels.

4.2 Middle Schools

CMOs in middle schools provide gains for Hispanic students compared to their independent counterparts. CMOs perform .05 standard deviations better on the AYP language arts test and .16 standard deviations better on the CST language arts proficiency metric for every 10 percent Hispanic enrollment (figure 26). Similar gains are found on the CST math proficiency test, where CMOs outperform independent charters by .15 standard deviations for every 10 percent Hispanic enrollment. African-Americans, ELL, and low-income students performed no different at CMO middle schools versus independent charters. Hispanic students do well in middle school charters and accelerate even further if that charter is a CMO.

4.3 High Schools

The results for CMOs in high schools are mixed. CMO high schools outperform independent charters on the Academic Performance index by 1.16 standard deviations, but not significantly on any other metric (figure 27). This gain is not achieved from a subgroup but is due to relative gains from the overall population of the school. CMOs perform no different than independent charters in language arts. However, in this subject CMOs underperform independent charters by .08 standard deviations for every 10

percent Hispanic portion of enrollment. ELL students lowered CST math basic scores by .17 standard deviations at CMOs for every 10 percent of enrollment (figure 28). Low-income and African Americans had no differing effects on test scores at CMOs versus independent charters.

Compared to independent charters, CMOs have no effect in elementary school but significantly affect Hispanic students in both language arts and math in middle school. However, Hispanic students suffer in CMOs compared to independent charters on high school language arts tests. African Americans find no benefit from CMOs and ELL students contribute to lower results at both elementary and high school levels. The CMO middle schools gains echo the results all categories of charter schools have over TPS. This suggests that the middle school charter gains are partially attributable to CMOs. Hispanics do better on language arts and math tests in CMO middle schools but worst on language arts tests in high school. The overall under-performance of ELL students in CMOs compared to independent charters is consistent with the overall charter results. However, ELL students saw a benefit in elementary charter schools compared to TPS, but underperform in CMOs compared to independent middle charter schools.

5. Conclusion

This study finds inconclusive results on the overall effect of charter school. However, it finds that charter schools have significant language art and math benefits to minority students in middle school. The gains in language arts are higher than the gains in

mathematics. CMOs also contribute to significant middle school gains, to an even greater extent than independent charter schools. Charter schools are different from TPS because they train teachers and structure classes differently, and have different expectations of the students. CMOs in particular leverage these attributes by using their resources to institute teacher mentoring, peer teaching, and teacher residency programs. The resulting gain in middle school scores for minorities is not surprising. While charter schools strategies may not increase scores for white and high income students, these strategies strongly affect the weakest students in the LAUSD, the Hispanic ones (table five). Other studies have found a similar elevating effect between charter schools and Hispanic students. The effect size is larger in this study, in part, because charter schools in LAUSD have a larger effect on Hispanic students. This follows because a region with more struggling Hispanic students motivates schools to create a form that elevates this group's results. The particular effect of charter schools to benefit middle school minorities has two explanations. First, middle school age children are more elastic to the programs and tactics used by charter schools. Second, the penetration of CMOs in middle schools in the LAUSD is very large, measuring 44 percent of *all* schools. CMOs cause a bigger effect than independent charters, so the size of the presence of CMOs at the middle school level provides additional benefits to minority students. These gains are extended to FRLP and African American students, but to a lesser extent. Further research is needed to determine why charters and CMOs perform so strongly for minorities in middle schools.

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Table 1: Enrollment at Charter and Non-charter Schools

Year	**06-07**	**07-08**	**08-09**	**09-10**	**10-11**
Charter	96	123	148	156	189
Non-charter	705	701	707	715	726
Percent Charter	14	18	21	22	26

Table 2: Enrollment at CMOs as a percentage of Charter Schools

Year	**06-07**	**07-08**	**08-09**	**09-10**	**10-11**
Charter	96	123	148	156	189
CMO	19	34	44	47	81
Percent CMO	20	28	30	30	43

Table 3: Enrollment divided into Grade Levels

	Elementary		Middle		High	
School Year	**Non Charter**	**Charter**	**Non Charter**	**Charter**	**Non Charter**	**Charter**
2006 - 2007	466	53	57	10	85	21
2007 - 2008	472	52	74	21	71	45
2008 - 2009	462	61	74	27	71	54
2009 - 2010	462	61	81	30	76	57
2010 - 2011	462	82	80	39	86	61
Average Enrollment	670	400	1478	306	1819	431

Table Four

Summary	Charter	Non Charter	T-test
Enrollment	399	824	14.19**
Pupil-Teacher Ratio	20.75	19.99	-2.85**
Hispanic	60.07	71.54	10.08**
African American	21.46	11.61	-11.89**
Asian	2.84	3.57	2.67**
White	10.94	9.25	-2.45**
Free or Reduced Priced Lunches	74.55	75.19	0.65
ELL	21.23	29.56	8.66**
Year round	31.74	18.4	-8.09**
Fully Credentialed Teachers	71.01	92.19	26.74**
Services Ratio	173.01	94.47	-2.85**
Administrators Ratio	93.02	67.92	-2.89**
FEP	23.58	20.76	-3.87**
REFEP	24.33	14.11	-9.13**

Table Five: Correlations between Test Results and Independent Variables

	API	AYP LA	AYP Math	Math Prof	Math Basic	LA Prof	LA Basic
Hispanic	-0.31	-0.41	-0.26	-0.33	-0.24	-0.55	-0.4
Black	-0.1	-0.07	-0.14	-0.14	-0.15	-0.07	-0.09
Asian	0.32	0.37	0.31	0.37	0.29	0.48	0.37
White	0.43	0.52	0.38	0.44	0.35	0.66	0.5
Enrollment	-0.31	-0.18	-0.25	-0.25	-0.22	-0.14	-0.14
RPLP	-0.32	-0.45	-0.29	-0.28	-0.18	-0.55	-0.38
Cred. Teach.	0.27	0.18	0.35	0.25	0.23	0.16	0.13
Pupil Teach	.07	.08	.05	.00	.01	.08	.10

** $p<0.05$

Table Six: Student and School Characteristics

Elementary	Charter	Non Charter	T-test
Enrollment	400	670	10.22**
Pupil-Teacher Ratio	20.05	19.83	-1.3
Fully Credentialed Teachers	80.52	93.84	13.39**
Hispanic	54.29	71.63	9.93**
African American	23.22	10.44	-10.94**
Asian	3.47	3.81	0.77
White	14.82	9.92	-4.31**
Free or Reduced Priced Lunches	70.58	77.1	4.22**
ELL	24.04	32.66	5.71**
Middle	Charter	Non Charter	T-test
Enrollment	306	1478	18.39**
Pupil-Teacher Ratio	22.97	21.67	-2.26**
Fully Credentialed Teachers	61.65	89.94	12.33**
Hispanic	62.36	73.01	3.86**
African American	20.91	12.58	-3.59**
Asian	2.61	3.5	1.48
White	8.98	7.35	-1.17
Free or Reduced Priced Lunches	75.81	75.89	0.02
ELL	16.54	22.41	3.27**
High	Charter	Non Charter	T-test
Enrollment	431	1819	14.80**
Pupil-Teacher Ratio	20.58	22	3.00**
Fully Credentialed Teachers	62.13	88.27	15.30**
Hispanic	64.77	73.4	4.00**
African American	20.39	11.66	-4.91**
Asian	2.02	3.47	3.79**
White	7.38	7.57	0.17
Free or Reduced Priced Lunches	79.21	71.67	-4.59**
ELL	18.73	22.11	2.33**

** $p<0.05$

Overall Charter Effect (Standard Deviations)

Figure 1: The charter effect in Math and LA

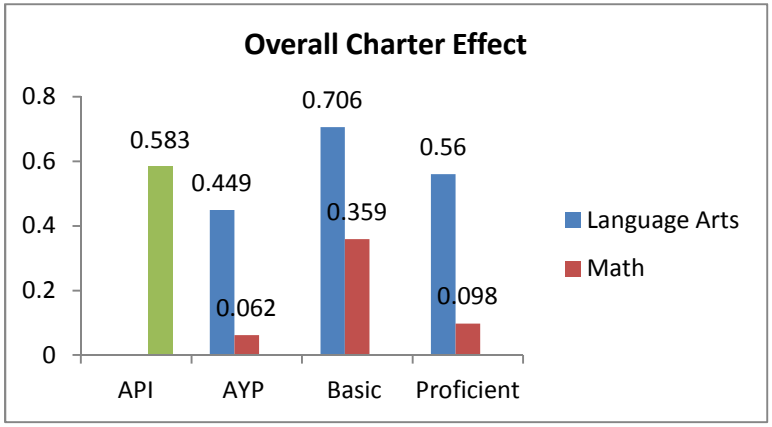


Figure 2: Hispanic Performance in Math

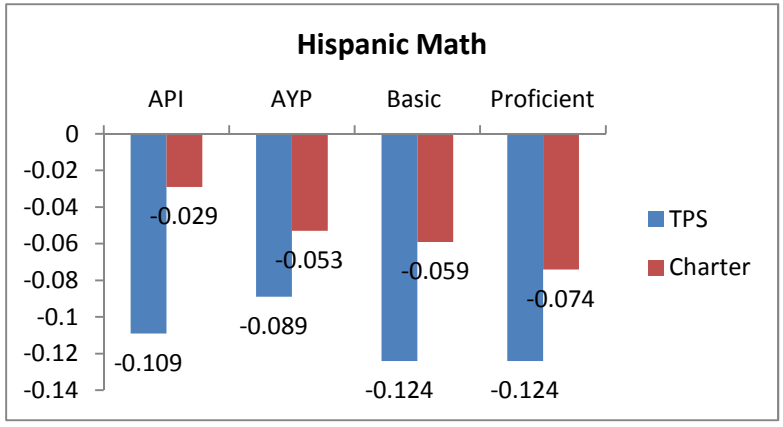


Figure 3: Hispanic Performance in Language Arts

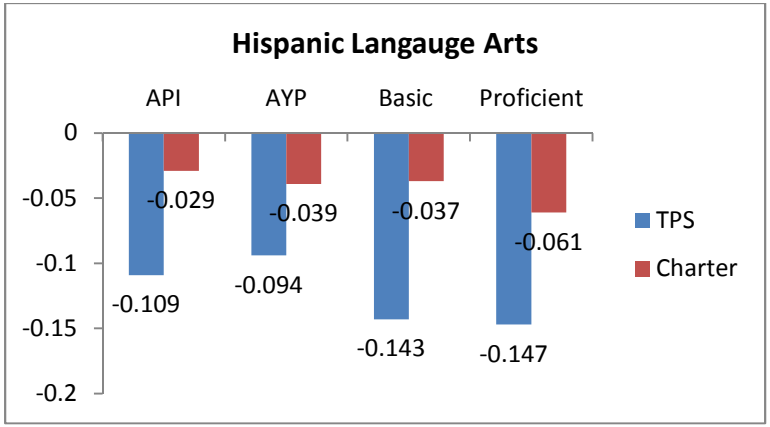
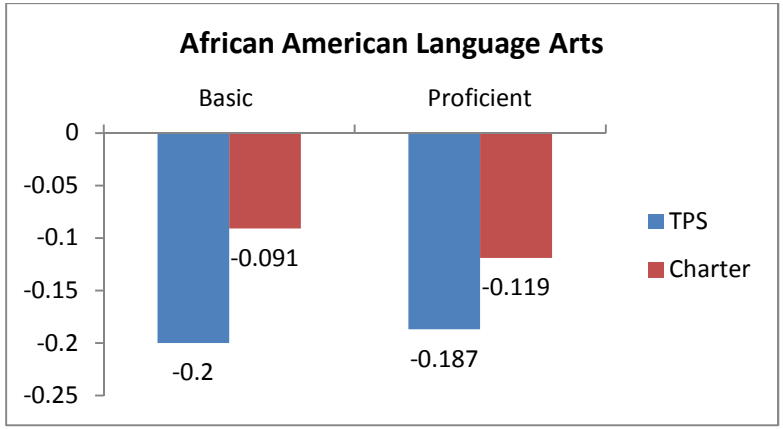


Figure 4: African American Performance in LA



*all results are significant at the .05 level unless otherwise indicated

Figure 5: African American Performance in Math

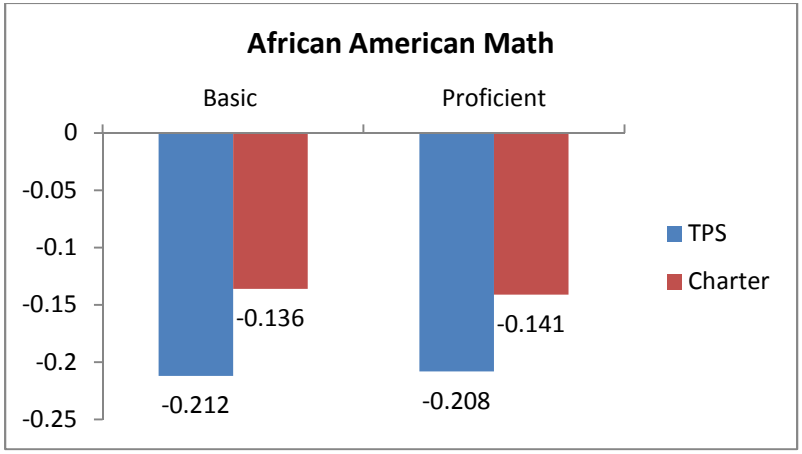
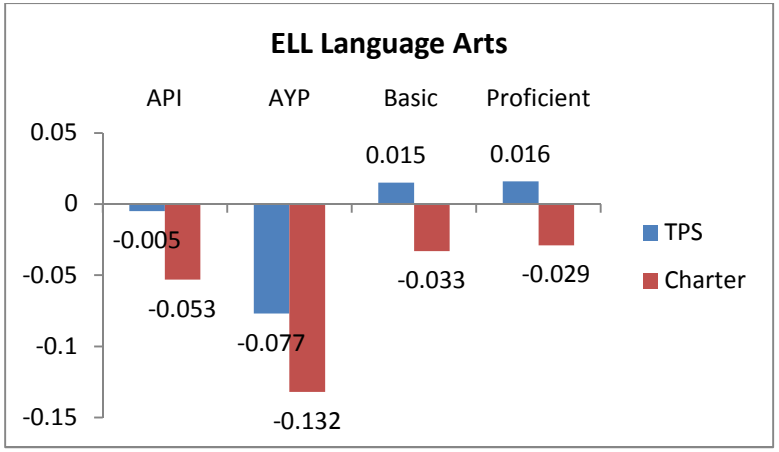


Figure 6: ELL Performance in LA



*all results are significant at the .05 level unless otherwise indicated
**The beta used to calculate the ELL LA basic result is not significant

The Charter Effect in Elementary Schools (Standard Deviations)

Figure 7: The Charter Effect in Elementary Schools

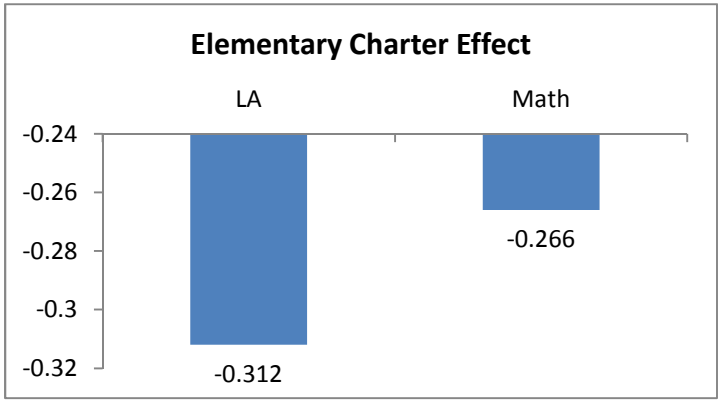


Figure 8: African Americans Performance in LA

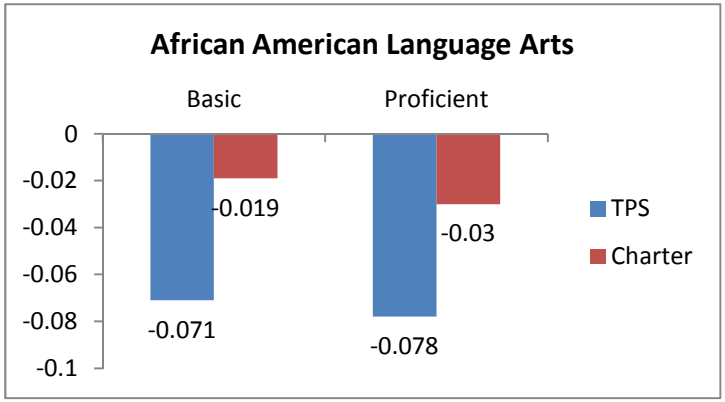


Figure 9: African American Performance in Math

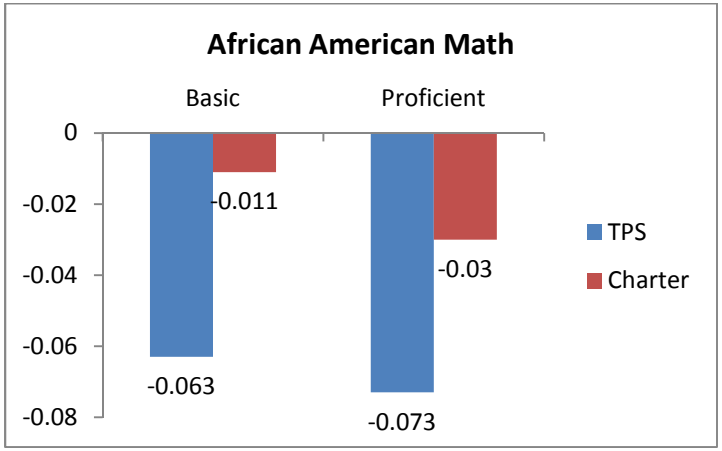
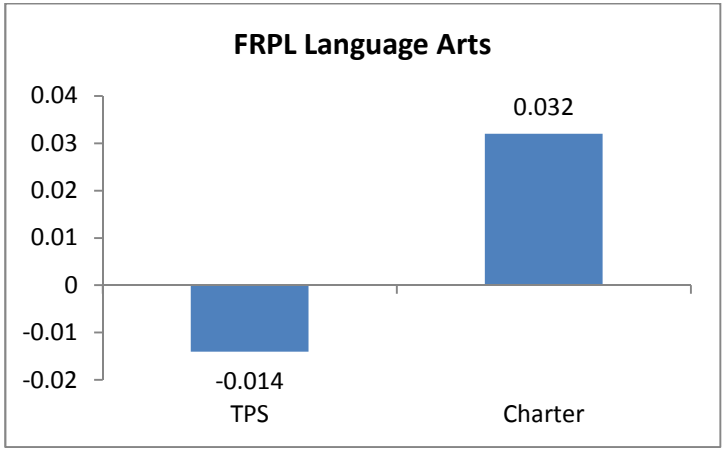


Figure 10: FRPL Performance in LA



*all results are significant at the .05 level unless otherwise indicated

Figure 11: FRPL Performance in Math

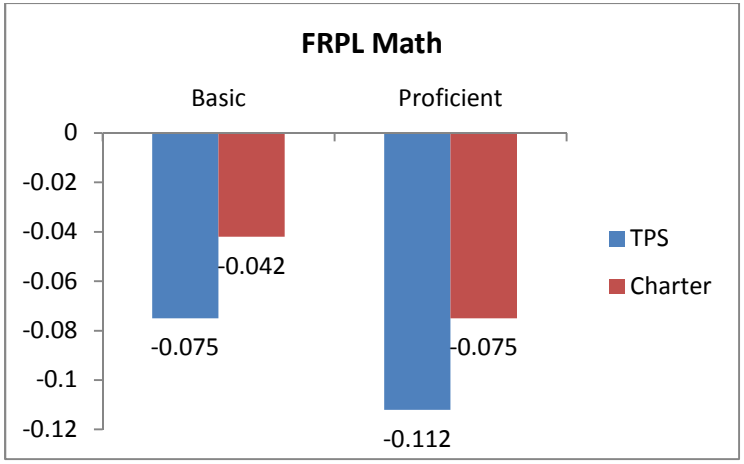


Figure 12: ELL Performance in LA

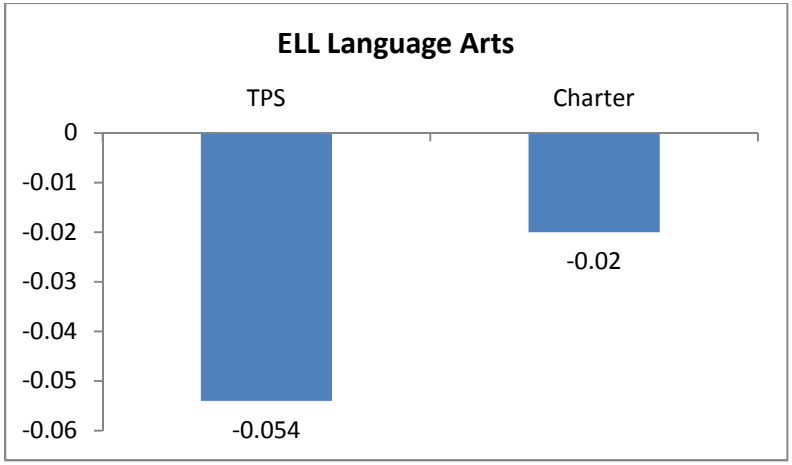
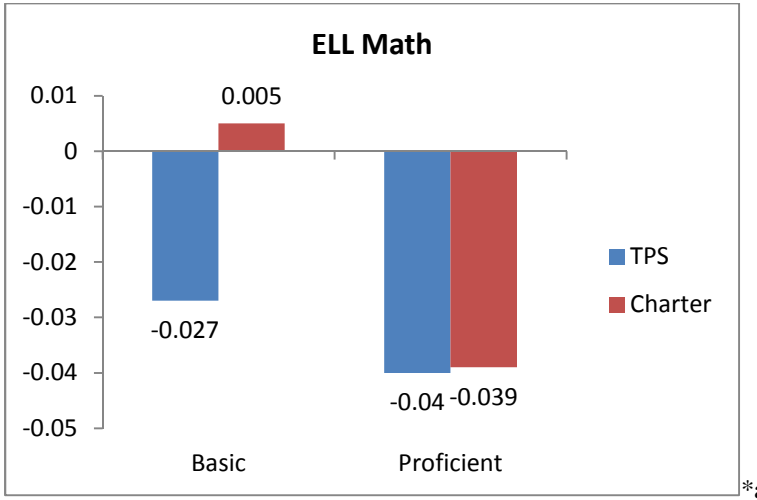


Figure 13: ELL Performance in Math



*all results are significant at the .05 level unless otherwise indicated

The Charter Effect in Middle Schools (Standard Deviations)

Figure 14: Hispanic Performance in Language Arts

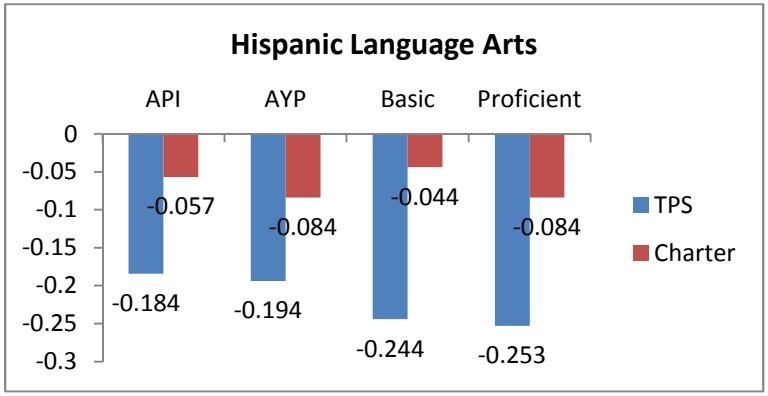


Figure 15: Hispanic Performance in Math

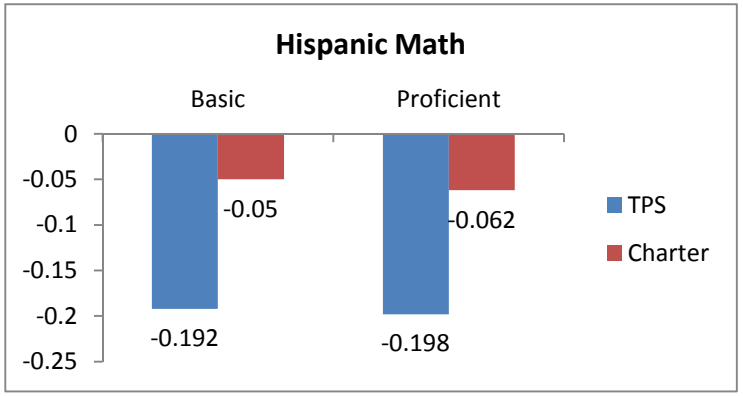


Figure 16: African American Performance in LA

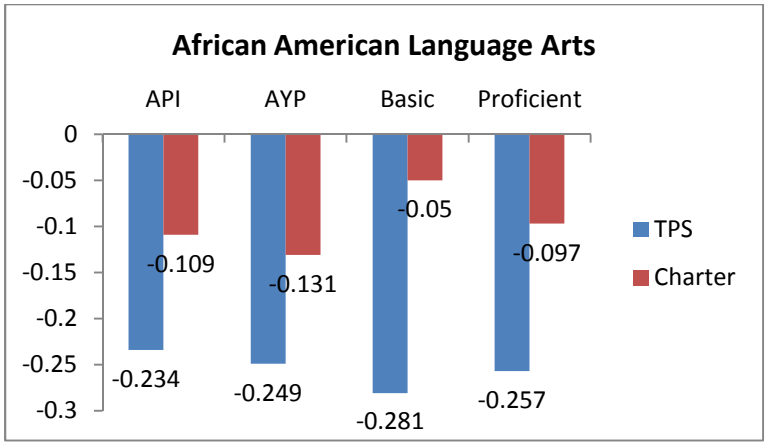
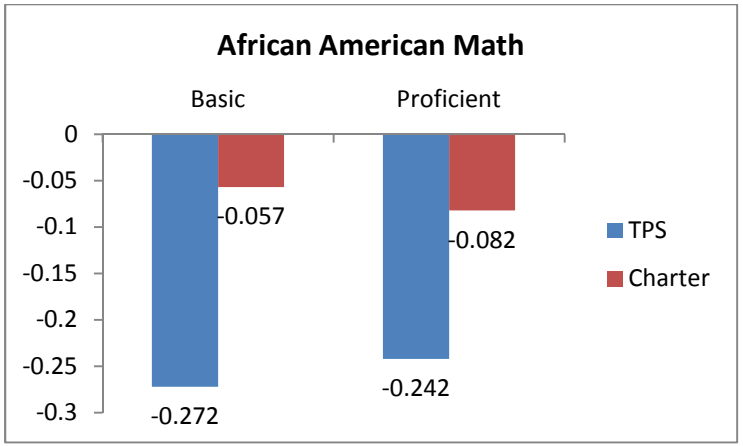


Figure 17: African American Performance in Math



*all results are significant at the .05 level unless otherwise indicated

The Charter Effect in High Schools (Standard Deviations)

Figure 18: The Overall Charter Effect in High School

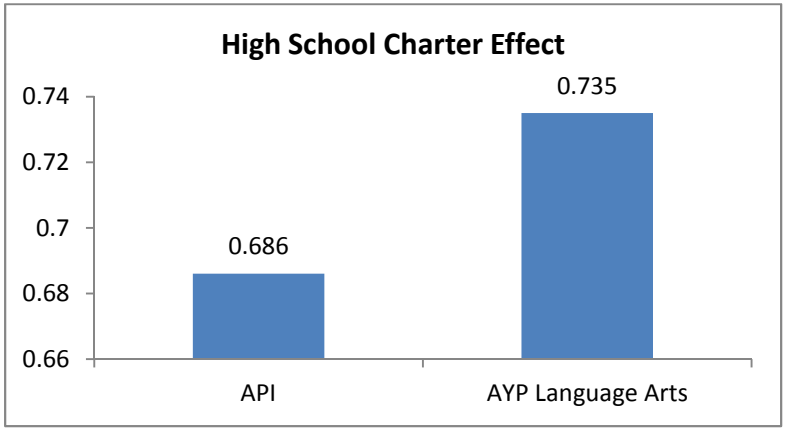


Figure 19: Hispanic Performance in Language Arts

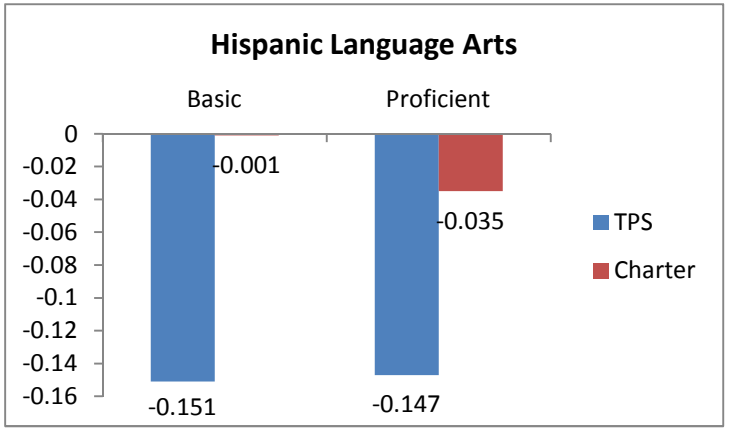
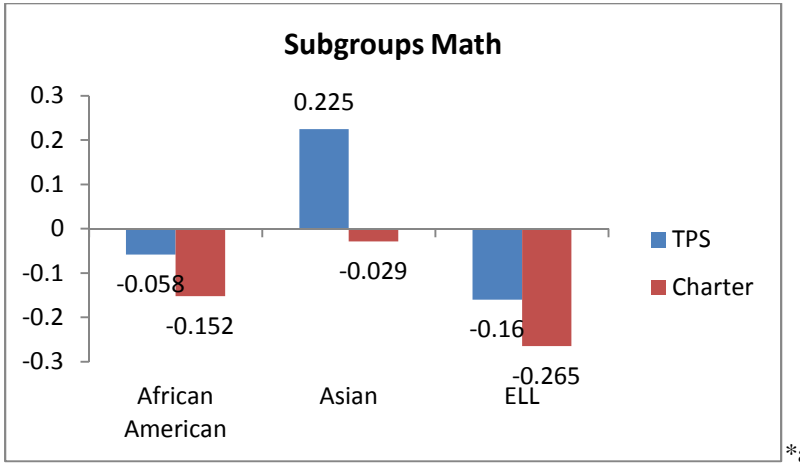


Figure 20: African American, Asian, and ELL Performance in Math



*all results are significant at the .05 level unless otherwise indicated

CMOs Compared to Independent Charter Schools (Standard Deviations)

Overall CMO Effect

Figure 21- Overall Hispanic Performance in LA

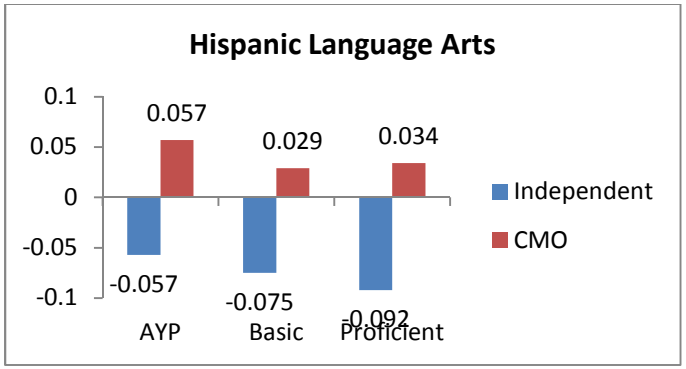


Figure 22: Overall Hispanic Performance in Math

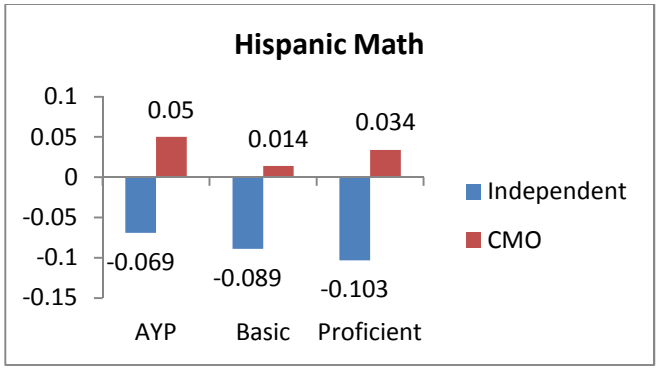


Figure 23: Overall ELL Performance in Language Arts

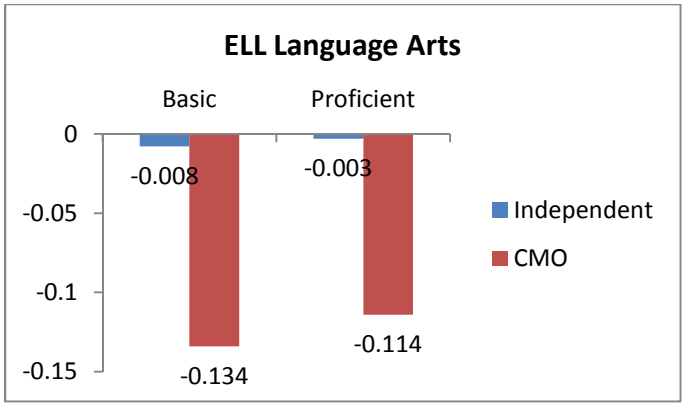
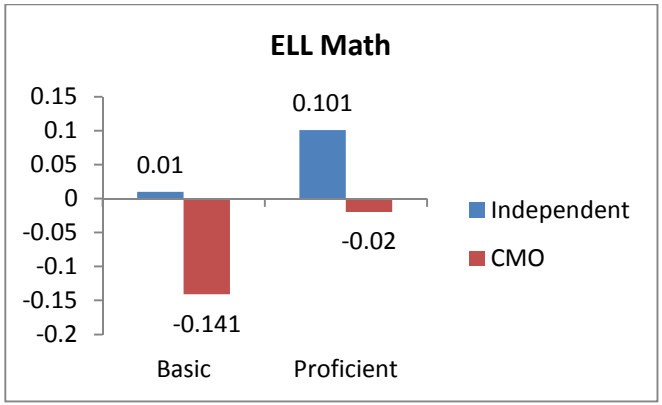


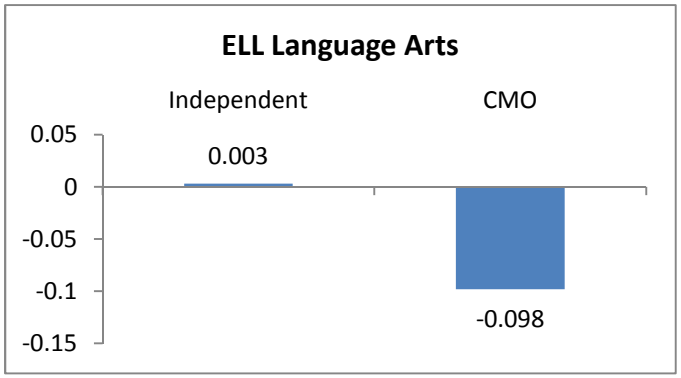
Figure 24: Overall ELL Performance in Math



*all results are significant at the .05 level unless otherwise indicated, **The ELL beta used to compute the ELL LA results is not significant

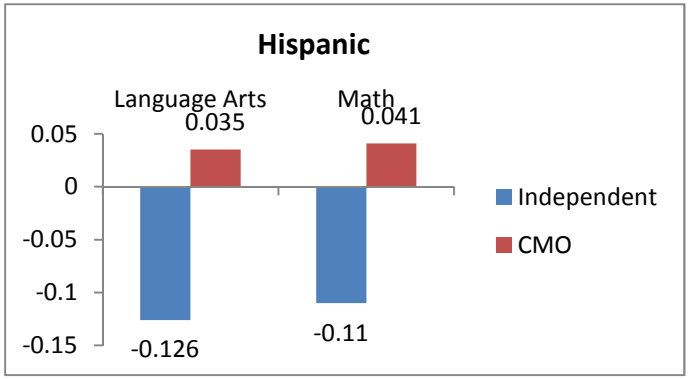
CMO Effect in Elementary School

Figure 25: ELL Performance in LA



CMO Effect in Middle School

Figure 26: Hispanic Performance in LA and Math



CMO Effect in High School

Figure 27: Overall CMO Effect in High School

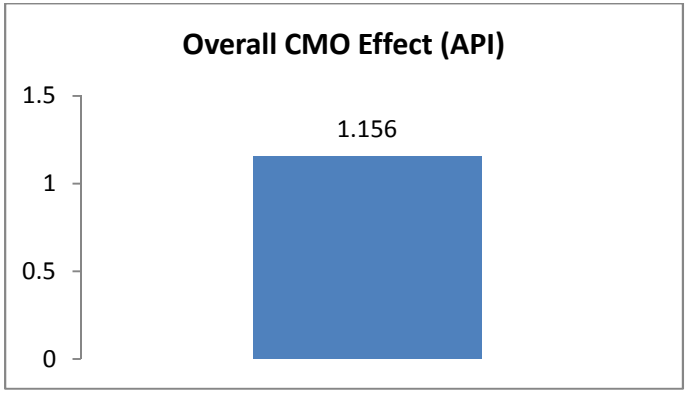
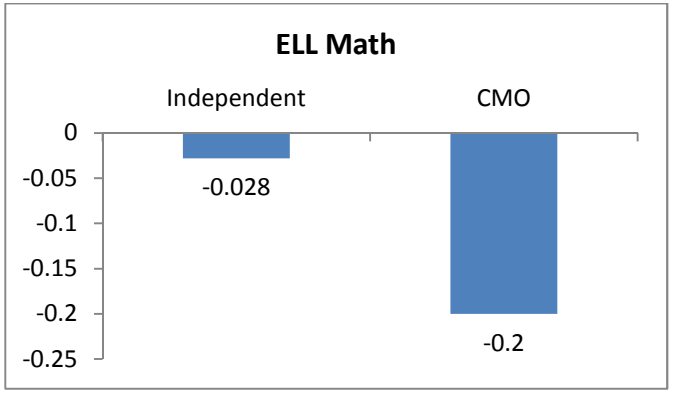


Figure 28: ELL Performance in Math



*all results are significant at the .05 level unless otherwise indicated

Table 7 – Overall Charter Effects

VARIABLES	(1) z1api	(1) z1ayplangart	(2) z1cstlangartbasic	(3) z1cstlangartproficient	(1) z1aypmath	(2) z1cstmathbasic	(3) z1cstmathproficient
charter	0.583***	0.449***	0.706***	0.560***	0.0623	0.359**	0.0978
	(0.146)	(0.133)	(0.140)	(0.125)	(0.149)	(0.142)	(0.136)
his mean	-0.0109***	-0.00937***	-0.0143***	-0.0147***	-0.00894***	-0.0124***	-0.0124***
	(0.00111)	(0.000996)	(0.00106)	(0.000942)	(0.00112)	(0.00107)	(0.00103)
charterXhispmean	0.00777***	0.00546***	0.0106***	0.00863***	0.00362	0.00650***	0.00497**
	(0.00227)	(0.00205)	(0.00219)	(0.00195)	(0.00230)	(0.00221)	(0.00212)
aframmean	-0.0171***	-0.0138***	-0.0200***	-0.0187***	-0.0155***	-0.0212***	-0.0208***
	(0.00130)	(0.00119)	(0.00125)	(0.00111)	(0.00133)	(0.00126)	(0.00120)
charterXaframmean	0.00447*	0.00111	0.0109***	0.00681***	0.00140	0.00763***	0.00669***
	(0.00238)	(0.00215)	(0.00230)	(0.00204)	(0.00241)	(0.00232)	(0.00222)
asianmean	0.0138***	0.0147***	0.0119***	0.0162***	0.0142***	0.0113***	0.0149***
	(0.00280)	(0.00254)	(0.00271)	(0.00241)	(0.00285)	(0.00274)	(0.00262)
charterXasianmean	-0.00334	-0.00867	-0.00221	-0.00129	-0.00145	0.000106	0.00177
	(0.00732)	(0.00661)	(0.00712)	(0.00633)	(0.00741)	(0.00718)	(0.00688)
freelunch	-0.00233**	-0.00893***	-0.00368***	-0.00982***	-0.00353***	0.00222**	-0.00172*
	(0.000964)	(0.000867)	(0.000907)	(0.000806)	(0.000973)	(0.000918)	(0.000879)
charterXfreelunch	-0.00218	-0.000587	-0.00242	-0.00202	0.000568	-0.00333*	-0.00136
	(0.00186)	(0.00169)	(0.00179)	(0.00159)	(0.00189)	(0.00181)	(0.00173)
ell	-0.000525	-0.00771***	0.00146*	0.00163**	0.000284	0.00753***	0.00697***
	(0.000854)	(0.000751)	(0.000813)	(0.000723)	(0.000839)	(0.000822)	(0.000787)
charterXell	-0.00480**	-0.00553***	-0.00478**	-0.00454***	-0.00432**	-0.00211	-0.000985
	(0.00198)	(0.00170)	(0.00192)	(0.00170)	(0.00190)	(0.00193)	(0.00185)
enroll	-0.000139***	-0.000139***	-1.81e-05	-4.02e-05**	-0.000216***	-0.000134***	-0.000172***
	(2.09e-05)	(1.91e-05)	(2.00e-05)	(1.78e-05)	(2.13e-05)	(2.03e-05)	(1.94e-05)
pupilteach	0.00880***	0.000135	0.0106***	0.00607***	0.00549**	0.0107***	0.00748***
	(0.00224)	(0.00205)	(0.00215)	(0.00191)	(0.00229)	(0.00217)	(0.00208)
yearround	-0.216***	-0.263***	-0.143***	-0.143***	-0.162***	-0.146***	-0.146***
	(0.0388)	(0.0344)	(0.0373)	(0.0331)	(0.0386)	(0.0377)	(0.0361)
fep	-0.0113***	-0.00380***	-0.00918***	-0.0101***	-0.00929***	-0.0219***	-0.0218***
	(0.00100)	(0.000925)	(0.000966)	(0.000858)	(0.00104)	(0.000979)	(0.000937)
refep	0.00469***	0.00209***	0.00501***	0.00443***	0.00357***	0.00611***	0.00544***
	(0.000525)	(0.000457)	(0.000505)	(0.000449)	(0.000513)	(0.000510)	(0.000488)
year	0.0333***	0.0556***	0.0826***	0.104***	0.0545***	0.0116	0.0331***
	(0.0125)	(0.0114)	(0.0121)	(0.0108)	(0.0128)	(0.0123)	(0.0118)
Constant	0.177*	0.887***	-0.141	0.404***	0.328***	-0.130	0.235***
	(0.0955)	(0.0874)	(0.0906)	(0.0805)	(0.0976)	(0.0917)	(0.0878)
Observations	3,850	3,879	3,892	3,892	3,895	3,874	3,874
R-squared	0.263	0.393	0.305	0.450	0.235	0.283	0.345

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Charter Effect in Elementary School

VARIABLES	(1) z1api	(1) z1ayplangart	(2) z1cstlangartbasic	(3) z1cstlangartproficient	(1) z1aypmath	(2) z1cstmathbasic	(3) z1cstmathproficient
charter	-0.0229	0.229	-0.312***	-0.0726	-0.203	-0.266***	-0.277**
	(0.143)	(0.154)	(0.120)	(0.122)	(0.154)	(0.0888)	(0.111)
his mean	-0.00181**	-0.00383***	-0.00469***	-0.00599***	-0.000880	-0.00205***	-0.00273***
	(0.000851)	(0.000914)	(0.000716)	(0.000730)	(0.000916)	(0.000529)	(0.000663)
charterXhispmean	0.00104	0.00305	-0.000204	0.00151	5.93e-05	-0.000741	-0.000853
	(0.00220)	(0.00237)	(0.00184)	(0.00188)	(0.00237)	(0.00136)	(0.00171)
aframmean	-0.00594***	-0.00766***	-0.00707***	-0.00781***	-0.00643***	-0.00628***	-0.00729***
	(0.00106)	(0.00115)	(0.000895)	(0.000911)	(0.00115)	(0.000661)	(0.000828)
charterXaframmean	0.000694	0.000898	0.00515***	0.00482**	0.00163	0.00414***	0.00425**
	(0.00230)	(0.00250)	(0.00194)	(0.00197)	(0.00250)	(0.00143)	(0.00179)
asianmean	0.00781***	0.0100***	0.00540***	0.00925***	0.00957***	0.00525***	0.00955***
	(0.00202)	(0.00221)	(0.00170)	(0.00173)	(0.00221)	(0.00125)	(0.00157)
charterXasianmean	-0.00130	-0.00415	0.00647	0.00980	-0.00352	0.00245	0.00651
	(0.00745)	(0.00811)	(0.00631)	(0.00643)	(0.00812)	(0.00466)	(0.00584)
freelunch	-0.0115***	-0.0140***	-0.0139***	-0.0190***	-0.0106***	-0.00750***	-0.0112***
	(0.000782)	(0.000835)	(0.000655)	(0.000668)	(0.000835)	(0.000484)	(0.000606)
charterXfreelunch	0.00358*	0.00223	0.00456***	0.00273*	0.00353*	0.00328***	0.00366**
	(0.00185)	(0.00199)	(0.00156)	(0.00159)	(0.00199)	(0.00116)	(0.00145)
ell	-0.00740***	-0.0114***	-0.00536***	-0.00501***	-0.00612***	-0.00272***	-0.00397***
	(0.000750)	(0.000758)	(0.000619)	(0.000630)	(0.000758)	(0.000457)	(0.000572)
charterXell	0.000286	-0.00189	0.00337**	0.00224	0.000766	0.00324***	0.00369***
	(0.00173)	(0.00175)	(0.00146)	(0.00148)	(0.00175)	(0.00108)	(0.00135)
enroll	-0.000327***	-0.000290***	-0.000109***	-0.000102***	-0.000364***	-5.16e-05***	-5.56e-05**
	(2.95e-05)	(3.15e-05)	(2.55e-05)	(2.60e-05)	(3.15e-05)	(1.88e-05)	(2.36e-05)
pupilteach	0.00202	8.61e-05	0.00103	0.0101**	-0.00474	-0.00433	-0.00107
	(0.00520)	(0.00548)	(0.00438)	(0.00446)	(0.00549)	(0.00323)	(0.00405)
yearround	-0.107***	-0.191***	-0.0493*	-0.0769***	-0.0888**	-0.0491**	-0.0622**
	(0.0327)	(0.0345)	(0.0273)	(0.0278)	(0.0346)	(0.0202)	(0.0252)
fep	0.0124***	0.0120***	0.0149***	0.0113***	0.00929***	0.00631***	0.00698***
	(0.00158)	(0.00155)	(0.00131)	(0.00133)	(0.00156)	(0.000967)	(0.00121)
refep	0.00200*	-0.000353	0.00224**	0.00451***	0.00147	0.00217***	0.00466***
	(0.00117)	(0.000904)	(0.000902)	(0.000919)	(0.000905)	(0.000667)	(0.000835)
year	0.140***	0.122***	0.138***	0.166***	0.140***	0.0838***	0.105***
	(0.0113)	(0.0123)	(0.00956)	(0.00974)	(0.0123)	(0.00706)	(0.00884)
Constant	0.938***	1.176***	0.834***	0.921***	1.075***	0.909***	1.059***
	(0.120)	(0.127)	(0.102)	(0.104)	(0.127)	(0.0753)	(0.0942)
Observations	2,432	2,535	2,438	2,438	2,538	2,437	2,437
R-squared	0.477	0.550	0.558	0.691	0.386	0.425	0.509

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Charter Effect in Middle School

VARIABLES	(1) z1api	(1) z1ayplangart	(2) z1cstlangartbasic	(3) z1cstlangartproficient	(1) z1aypmath	(2) z1cstmathbasic	(3) z1cstmathproficient
charter	0.131	0.173	0.113	0.138	-0.439	-0.201	-0.216
	(0.338)	(0.327)	(0.288)	(0.269)	(0.389)	(0.247)	(0.257)
his mean	-0.0184***	-0.0194***	-0.0244***	-0.0253***	-0.0150***	-0.0192***	-0.0198***
	(0.00402)	(0.00389)	(0.00344)	(0.00321)	(0.00463)	(0.00294)	(0.00306)
charterXhispmean	0.0127**	0.0110**	0.0200***	0.0169***	0.00650	0.0142***	0.0136***
	(0.00519)	(0.00501)	(0.00443)	(0.00414)	(0.00597)	(0.00379)	(0.00395)
aframmean	-0.0234***	-0.0249***	-0.0281***	-0.0257***	-0.0221***	-0.0272***	-0.0242***
	(0.00411)	(0.00397)	(0.00351)	(0.00328)	(0.00473)	(0.00301)	(0.00313)
charterXaframmean	0.0125**	0.0118**	0.0231***	0.0160***	0.00555	0.0215***	0.0160***
	(0.00530)	(0.00512)	(0.00453)	(0.00424)	(0.00610)	(0.00388)	(0.00404)
asianmean	0.0127	0.0123	0.00481	0.00661	0.0212**	0.00497	0.00873
	(0.00931)	(0.00901)	(0.00797)	(0.00745)	(0.0107)	(0.00683)	(0.00711)
charterXasianmean	-0.0133	-0.0187	-0.00669	-0.0134	-0.0249	-0.00612	-0.0116
	(0.0164)	(0.0159)	(0.0140)	(0.0131)	(0.0189)	(0.0120)	(0.0125)
freelunch	-0.00683**	-0.00848***	-0.00938***	-0.0112***	-0.00933**	-0.00659***	-0.00633**
	(0.00330)	(0.00317)	(0.00280)	(0.00262)	(0.00378)	(0.00240)	(0.00250)
charterXfreelunch	0.00792*	0.00368	0.00695*	0.00602*	0.0118**	0.00724**	0.00890***
	(0.00438)	(0.00422)	(0.00373)	(0.00349)	(0.00502)	(0.00320)	(0.00333)
ell	-0.00502*	-0.0133***	-0.00311	-0.00186	0.00223	-0.00264	-0.000562
	(0.00303)	(0.00289)	(0.00254)	(0.00237)	(0.00343)	(0.00217)	(0.00226)
charterXell	-0.00758	-0.00557	-0.00685	-0.00998**	-0.0141**	-0.00135	-0.00698*
	(0.00538)	(0.00495)	(0.00438)	(0.00409)	(0.00589)	(0.00375)	(0.00390)
enroll	-4.23e-05	-0.000126**	-0.000123**	-1.08e-05	-0.000215***	-8.43e-05**	-1.39e-05
	(5.92e-05)	(5.77e-05)	(4.97e-05)	(4.65e-05)	(6.80e-05)	(4.26e-05)	(4.43e-05)
pupilteach	0.00315	0.00921	-0.00232	0.00527	0.00660	-0.00256	0.00149
	(0.00802)	(0.00767)	(0.00678)	(0.00634)	(0.00913)	(0.00581)	(0.00604)
yearround	-0.186*	-0.228**	-0.0555	-0.0479	-0.107	0.0347	0.0213
	(0.0962)	(0.0912)	(0.0809)	(0.0757)	(0.109)	(0.0693)	(0.0722)
fep	-0.000865	0.000813	0.000710	2.04e-05	-0.00204	0.00277*	0.00212
	(0.00223)	(0.00210)	(0.00186)	(0.00173)	(0.00250)	(0.00159)	(0.00165)
refep	0.00118**	0.00108**	0.000675	0.000915**	0.00213***	0.00105***	0.00138***
	(0.000556)	(0.000536)	(0.000474)	(0.000443)	(0.000638)	(0.000406)	(0.000423)
year	0.0474	-0.00468	0.127***	0.142***	0.0275	0.0875***	0.135***
	(0.0334)	(0.0322)	(0.0283)	(0.0264)	(0.0382)	(0.0242)	(0.0252)
Constant	0.122	0.560*	0.396	0.0974	-0.00416	0.0754	-0.562**
	(0.346)	(0.335)	(0.295)	(0.275)	(0.399)	(0.252)	(0.263)
Observations	414	418	420	420	419	420	420
R-squared	0.475	0.542	0.608	0.639	0.361	0.545	0.542

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Charter Effect in High School

VARIABLES	(1) z1api	(1) z1ayplangart	(2) z1cstlangartbasic	(3) z1cstlangartproficient	(1) z1aypmath	(2) z1cstmathbasic	(3) z1cstmathproficient
charter	0.686**	0.735**	0.333	0.405	0.431	0.391	0.327
	(0.312)	(0.329)	(0.297)	(0.263)	(0.351)	(0.281)	(0.213)
his mean	-0.0119***	-0.0130***	-0.0151***	-0.0147***	-0.0108**	-0.0112***	-0.00570**
	(0.00393)	(0.00401)	(0.00372)	(0.00330)	(0.00427)	(0.00352)	(0.00267)
charterXhispmean	0.0103**	0.00925*	0.0150***	0.0112***	0.00641	0.00522	9.53e-05
	(0.00505)	(0.00519)	(0.00480)	(0.00426)	(0.00553)	(0.00455)	(0.00344)
aframmean	-0.0101**	-0.0109**	-0.0154***	-0.0135***	-0.0105**	-0.0138***	-0.00579*
	(0.00450)	(0.00452)	(0.00415)	(0.00368)	(0.00477)	(0.00393)	(0.00297)
charterXaframmean	-0.00564	-0.00735	0.00317	-0.00266	-0.00716	-0.00639	-0.00939**
	(0.00553)	(0.00558)	(0.00515)	(0.00457)	(0.00590)	(0.00487)	(0.00369)
asianmean	0.0172	0.0158	0.00992	0.0228**	0.0264*	0.0271**	0.0225***
	(0.0126)	(0.0128)	(0.0119)	(0.0106)	(0.0137)	(0.0113)	(0.00853)
charterXasianmean	-0.00418	-0.0151	-0.00507	-0.0136	-0.00397	-0.0313*	-0.0254**
	(0.0183)	(0.0187)	(0.0174)	(0.0154)	(0.0199)	(0.0165)	(0.0125)
freelunch	-0.00240	-0.00462	-0.0104***	-0.0114***	-0.00259	-0.00882***	-0.00625***
	(0.00301)	(0.00309)	(0.00286)	(0.00253)	(0.00329)	(0.00270)	(0.00205)
charterXfreelunch	-0.00263	-0.00642	0.000780	-0.000786	-0.00306	0.00168	0.000990
	(0.00399)	(0.00423)	(0.00381)	(0.00338)	(0.00450)	(0.00361)	(0.00273)
ell	-0.0164***	-0.0286***	-0.0199***	-0.0155***	-0.0160***	-0.00669***	-0.00363**
	(0.00279)	(0.00280)	(0.00257)	(0.00228)	(0.00298)	(0.00243)	(0.00184)
charterXell	-0.00747*	-0.00274	-0.00548	-0.00599	-0.0105**	-0.00335	-0.00274
	(0.00447)	(0.00459)	(0.00424)	(0.00376)	(0.00490)	(0.00401)	(0.00304)
enroll	-0.000130***	-7.94e-05**	-0.000191***	-0.000129***	-9.03e-05**	-7.08e-05**	-2.38e-05
	(3.31e-05)	(3.39e-05)	(3.12e-05)	(2.76e-05)	(3.61e-05)	(2.95e-05)	(2.23e-05)
pupilteach	0.0237***	0.0211***	0.0342***	0.0374***	0.0181***	0.0289***	0.0231***
	(0.00603)	(0.00638)	(0.00578)	(0.00513)	(0.00680)	(0.00548)	(0.00414)
yearround	-0.0553	0.0693	0.302***	0.220***	0.0941	0.136*	0.0145
	(0.0896)	(0.0914)	(0.0850)	(0.0754)	(0.0974)	(0.0805)	(0.0609)
fep	0.00805***	0.00985***	0.00735***	0.00570***	0.0134***	0.00368**	0.00296**
	(0.00197)	(0.00205)	(0.00188)	(0.00167)	(0.00219)	(0.00178)	(0.00134)
refep	0.00245***	0.00177**	0.00231***	0.00218***	0.00226**	0.00305***	0.00147**
	(0.000863)	(0.000886)	(0.000823)	(0.000730)	(0.000945)	(0.000779)	(0.000590)
year	-0.0349	0.0111	0.0661**	0.0576**	0.0587	0.0853***	0.0789***
	(0.0327)	(0.0336)	(0.0311)	(0.0276)	(0.0358)	(0.0294)	(0.0223)
Constant	-0.605**	0.0338	-0.114	-0.241	-0.811**	-1.522***	-1.562***
	(0.291)	(0.301)	(0.277)	(0.246)	(0.321)	(0.262)	(0.198)
Observations	541	547	551	551	548	551	551
R-squared	0.357	0.431	0.455	0.506	0.325	0.406	0.375

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: CMO Overall Effect

VARIABLES	(1) z1api	(1) z1ayplangart	(2) z1cstlangartbasic	(3) z1cstlangartproficient	(1) z1aypmath	(2) z1cstmathbasic	(3) z1cstmathproficient
cmo	0.380	-0.0552	0.429	0.0287	-0.124	0.554	0.268
	(0.355)	(0.375)	(0.332)	(0.327)	(0.429)	(0.391)	(0.394)
hisp	-0.00531**	-0.00566**	-0.00745***	-0.00915***	-0.00693**	-0.00889***	-0.0103***
	(0.00222)	(0.00235)	(0.00207)	(0.00204)	(0.00269)	(0.00244)	(0.00246)
cmoXhispmean	0.00839*	0.0114**	0.0104**	0.0126***	0.0119**	0.0103**	0.0137***
	(0.00473)	(0.00502)	(0.00443)	(0.00437)	(0.00574)	(0.00523)	(0.00526)
afram	-0.00915***	-0.0118***	-0.00602***	-0.00898***	-0.00964***	-0.00782***	-0.00905***
	(0.00229)	(0.00242)	(0.00215)	(0.00212)	(0.00277)	(0.00253)	(0.00255)
cmoXaframmean	0.00126	0.00862*	0.00149	0.00397	0.00421	-0.00411	-0.000119
	(0.00481)	(0.00510)	(0.00451)	(0.00445)	(0.00584)	(0.00532)	(0.00535)
asian	0.0108	0.00430	0.00965	0.0200**	0.0132	0.0134	0.0253**
	(0.00910)	(0.00957)	(0.00859)	(0.00847)	(0.0109)	(0.0101)	(0.0102)
cmoXasianmean	-0.00478	0.00462	-0.000747	-0.00882	-0.00471	-0.00735	-0.0162
	(0.0136)	(0.0144)	(0.0128)	(0.0126)	(0.0165)	(0.0151)	(0.0152)
freelunch	-0.00433**	-0.00821***	-0.00747***	-0.0125***	-0.00281	-0.00234	-0.00352*
	(0.00179)	(0.00193)	(0.00169)	(0.00166)	(0.00221)	(0.00199)	(0.00200)
cmoXfreelunch	-0.00533	-0.00244	-0.00233	0.00110	-0.000118	-0.00460	-0.00212
	(0.00440)	(0.00463)	(0.00412)	(0.00406)	(0.00530)	(0.00486)	(0.00489)
ell	-0.00298	-0.0125***	-0.000782	-0.000293	-0.000459	0.00999***	0.0101***
	(0.00212)	(0.00212)	(0.00200)	(0.00198)	(0.00242)	(0.00236)	(0.00238)
cmoXell	-0.00788*	-0.00154	-0.0126***	-0.0111***	-0.00745	-0.0151***	-0.0121***
	(0.00407)	(0.00412)	(0.00381)	(0.00376)	(0.00471)	(0.00450)	(0.00453)
enroll	7.71e-05	0.000160**	-3.14e-05	-2.22e-05	0.000221**	-6.29e-06	-8.15e-05
	(7.19e-05)	(7.60e-05)	(6.75e-05)	(6.65e-05)	(8.70e-05)	(7.96e-05)	(8.01e-05)
pupilteach	0.0115**	0.00707	0.0184***	0.0173***	0.00124	0.0135**	0.00830
	(0.00550)	(0.00588)	(0.00518)	(0.00511)	(0.00673)	(0.00611)	(0.00615)
yearround	-0.384***	-0.308***	-0.0368	-0.145	-0.434***	-0.147	-0.286**
	(0.100)	(0.104)	(0.0946)	(0.0933)	(0.119)	(0.112)	(0.112)
fep	-0.00176	0.000134	0.00273	-0.00131	-0.00197	-0.0101***	-0.0128***
	(0.00191)	(0.00198)	(0.00178)	(0.00175)	(0.00227)	(0.00210)	(0.00211)
refep	0.00150***	0.000804	0.000941*	0.000992*	0.00162**	0.00209***	0.00180***
	(0.000566)	(0.000569)	(0.000525)	(0.000517)	(0.000651)	(0.000619)	(0.000623)
year	0.0473	0.0864**	0.129***	0.145***	0.107***	0.0888**	0.0943**
	(0.0343)	(0.0357)	(0.0324)	(0.0320)	(0.0409)	(0.0382)	(0.0385)
Constant	0.890***	1.390***	0.601***	1.129***	0.605**	0.344	0.696***
	(0.237)	(0.252)	(0.223)	(0.220)	(0.288)	(0.263)	(0.265)
Observations	657	688	662	662	688	662	662
R-squared	0.286	0.372	0.301	0.470	0.237	0.231	0.300

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: CMO Elementary School Effect

VARIABLES	(1) z1api	(1) z1ayplangart	(2) z1cstlangartbasic	(3) z1cstlangartproficient	(1) z1aypmath	(2) z1cstmathbasic	(3) z1cstmathproficient
cmo	-0.469	-0.679	-0.343	-0.268	-1.166	-0.216	-0.299
	(1.041)	(1.150)	(0.973)	(1.025)	(1.202)	(0.801)	(0.997)
his mean	-0.00188	-0.00235	-0.00741***	-0.00730***	-0.00243	-0.00439**	-0.00551**
	(0.00270)	(0.00304)	(0.00248)	(0.00262)	(0.00318)	(0.00204)	(0.00254)
cmoXhispmean	-0.00387	-0.00464	0.00296	0.00407	-0.0125	-0.000515	-0.000421
	(0.0149)	(0.0168)	(0.0140)	(0.0147)	(0.0175)	(0.0115)	(0.0143)
aframmean	-0.00556**	-0.00754**	-0.00225	-0.00325	-0.00414	-0.00195	-0.00229
	(0.00276)	(0.00317)	(0.00257)	(0.00271)	(0.00331)	(0.00212)	(0.00263)
cmoXaframmean	-0.00355	-0.00267	-0.00345	-0.00442	-0.0156	-0.00708	-0.0111
	(0.0131)	(0.0150)	(0.0122)	(0.0128)	(0.0157)	(0.0100)	(0.0125)
asianmean	0.00445	0.00275	0.00909	0.0174*	0.00538	0.00691	0.0186*
	(0.00993)	(0.0114)	(0.00936)	(0.00986)	(0.0119)	(0.00770)	(0.00959)
cmoXasianmean	0.00420	0.0111	0.00744	0.00206	-0.0124	-0.00448	-0.0224
	(0.0248)	(0.0289)	(0.0232)	(0.0244)	(0.0302)	(0.0191)	(0.0237)
freelunch	-0.00699***	-0.0108***	-0.00920***	-0.0161***	-0.00627**	-0.00404**	-0.00735***
	(0.00219)	(0.00250)	(0.00206)	(0.00217)	(0.00262)	(0.00169)	(0.00211)
cmoXfreelunch	0.00945	0.0146	0.0122	0.0126	0.0237	0.00883	0.0125
	(0.0143)	(0.0157)	(0.0133)	(0.0141)	(0.0164)	(0.0110)	(0.0137)
ell	-0.00527**	-0.0108***	0.000376	0.000325	-0.00149	0.00267	0.00281
	(0.00242)	(0.00258)	(0.00228)	(0.00240)	(0.00269)	(0.00188)	(0.00233)
cmoXell	-0.00172	-0.00481	-0.00721	-0.0101**	-0.00890	-0.00558	-0.00848*
	(0.00505)	(0.00538)	(0.00471)	(0.00496)	(0.00563)	(0.00387)	(0.00482)
enroll	1.03e-05	0.000131	-2.64e-05	-0.000134	9.60e-05	-4.83e-05	-0.000124
	(0.000118)	(0.000134)	(0.000109)	(0.000115)	(0.000140)	(8.96e-05)	(0.000111)
pupilteach	0.000148	-0.000643	0.00289	0.00874	-0.00326	6.20e-05	-0.000479
	(0.00952)	(0.0107)	(0.00888)	(0.00935)	(0.0112)	(0.00731)	(0.00909)
yearround	-0.557***	-0.683***	-0.230*	-0.352**	-0.670***	-0.270**	-0.364***
	(0.143)	(0.157)	(0.135)	(0.143)	(0.164)	(0.111)	(0.139)
fep	0.00650	0.00649	0.0131***	0.0109**	0.00378	0.00463	0.00586
	(0.00509)	(0.00503)	(0.00448)	(0.00471)	(0.00525)	(0.00368)	(0.00459)
refep	0.000161	-0.000842	-0.00115	-0.000240	0.000127	5.74e-05	0.00102
	(0.00214)	(0.00143)	(0.00170)	(0.00179)	(0.00149)	(0.00140)	(0.00174)
year	0.0673	0.0565	0.130***	0.149***	0.0830	0.0550	0.0830*
	(0.0474)	(0.0526)	(0.0450)	(0.0474)	(0.0550)	(0.0370)	(0.0461)
Constant	1.143***	1.498***	0.463	0.944***	0.894**	0.653***	0.886***
	(0.309)	(0.349)	(0.291)	(0.307)	(0.364)	(0.240)	(0.298)
Observations	275	304	280	280	304	280	280
R-squared	0.406	0.486	0.445	0.619	0.323	0.288	0.403

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13: CMO Middle School Effect

VARIABLES	(1) z1api	(1) z1ayplangart	(2) z1cstlangartbasic	(3) z1cstlangartproficient	(1) z1aypmath	(2) z1cstmathbasic	(3) z1cstmathproficient
cmo	-0.0875	-0.415	-0.558	-0.591	0.0331	0.0524	0.0186
	(0.591)	(0.678)	(0.484)	(0.569)	(0.796)	(0.526)	(0.607)
his mean	-0.00889**	-0.0128***	-0.00640*	-0.0126***	-0.0134**	-0.00840**	-0.0110***
	(0.00411)	(0.00467)	(0.00334)	(0.00392)	(0.00549)	(0.00363)	(0.00418)
cmoXhispmean	0.0108	0.0172**	0.00668	0.0161**	0.0164*	0.00880	0.0151**
	(0.00725)	(0.00834)	(0.00595)	(0.00699)	(0.00979)	(0.00647)	(0.00746)
aframmean	-0.0113***	-0.0130***	-0.00444	-0.00971**	-0.0140**	-0.00448	-0.00758*
	(0.00424)	(0.00489)	(0.00350)	(0.00411)	(0.00574)	(0.00381)	(0.00439)
cmoXaframmean	0.00952	0.0134	0.00354	0.0122*	0.0112	0.00314	0.00960
	(0.00743)	(0.00856)	(0.00612)	(0.00720)	(0.0101)	(0.00666)	(0.00768)
asianmean	0.00450	-0.00268	-0.0128	-0.0120	0.00599	-0.00145	-0.00296
	(0.0191)	(0.0217)	(0.0155)	(0.0182)	(0.0255)	(0.0168)	(0.0194)
cmoXasianmean	0.00443	0.0169	0.0217	0.0275	-0.00168	0.00395	0.0145
	(0.0293)	(0.0335)	(0.0239)	(0.0281)	(0.0394)	(0.0260)	(0.0300)
freelunch	0.00123	-0.00327	-0.00279	-0.00427	0.00249	0.00197	0.00411
	(0.00367)	(0.00421)	(0.00301)	(0.00354)	(0.00495)	(0.00327)	(0.00377)
cmoXfreelunch	0.00260	0.00314	0.00863	0.00599	0.00189	0.00145	0.000440
	(0.00702)	(0.00809)	(0.00577)	(0.00678)	(0.00950)	(0.00627)	(0.00724)
ell	-0.00755	-0.0125*	-0.00787	-0.00973	-0.00385	-0.00109	-0.00443
	(0.00673)	(0.00721)	(0.00517)	(0.00608)	(0.00846)	(0.00562)	(0.00648)
cmoXell	-0.0109	-0.00740	-0.0133	-0.0100	-0.00665	-0.00533	-0.00443
	(0.0105)	(0.0118)	(0.00843)	(0.00991)	(0.0139)	(0.00917)	(0.0106)
enroll	0.000267	0.000264	0.000156	0.000311*	0.000303	0.000230	0.000319
	(0.000193)	(0.000222)	(0.000159)	(0.000187)	(0.000261)	(0.000173)	(0.000199)
pupilteach	-0.00339	-0.00261	-0.00824	-0.00515	-0.0104	-0.0108	-0.0104
	(0.00990)	(0.0114)	(0.00814)	(0.00957)	(0.0134)	(0.00885)	(0.0102)
yearround	-0.0123	-0.0616	0.0364	0.0631	-0.0409	0.0935	0.0724
	(0.202)	(0.231)	(0.165)	(0.194)	(0.271)	(0.180)	(0.207)
fep	0.00281	0.00130	0.00265	0.00350	0.00374	0.00415	0.00518
	(0.00343)	(0.00387)	(0.00277)	(0.00325)	(0.00455)	(0.00301)	(0.00347)
refep	0.000992	0.00124*	0.000253	0.000668	0.00189**	0.000761	0.00108*
	(0.000600)	(0.000689)	(0.000491)	(0.000577)	(0.000809)	(0.000534)	(0.000616)
year	0.114	0.112	0.0719	0.143**	0.154	0.0679	0.148**
	(0.0708)	(0.0813)	(0.0581)	(0.0683)	(0.0954)	(0.0632)	(0.0728)
Constant	-0.197	0.233	0.645*	0.163	-1.086*	-0.239	-0.981**
	(0.442)	(0.507)	(0.363)	(0.426)	(0.595)	(0.394)	(0.455)
Observations	121	124	123	123	124	123	123
R-squared	0.310	0.356	0.272	0.399	0.298	0.209	0.292

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14: CMO High School Effect

VARIABLES	(1) z1api	(1) z1ayplangart	(2) z1cstlangartbasic	(3) z1cstlangartproficient	(1) z1aypmath	(2) z1cstmathbasic	(3) z1cstmathproficient
cmo	1.156**	-0.0812	0.657	0.0554	-0.348	0.840	0.599
	(0.497)	(0.599)	(0.528)	(0.483)	(0.618)	(0.529)	(0.421)
his mean	-0.00223	-0.00223	-0.000863	-0.00346	-0.00280	-0.00871**	-0.00810**
	(0.00383)	(0.00458)	(0.00410)	(0.00375)	(0.00472)	(0.00411)	(0.00327)
cmoXhispmean	-0.00391	-0.00170	-0.00369	-0.000866	-0.00616	0.00193	0.00299
	(0.00682)	(0.00805)	(0.00729)	(0.00667)	(0.00830)	(0.00730)	(0.00581)
aframmean	-0.00828**	-0.0122**	-0.00847*	-0.0127***	-0.00937*	-0.0158***	-0.0132***
	(0.00409)	(0.00477)	(0.00434)	(0.00397)	(0.00492)	(0.00434)	(0.00346)
cmoXaframmean	-0.0144*	-0.00434	-0.0124	-0.00610	-0.00594	-0.00968	-0.00376
	(0.00738)	(0.00864)	(0.00789)	(0.00722)	(0.00891)	(0.00790)	(0.00629)
asianmean	0.0154	0.0106	-0.000450	0.00960	0.0271	-0.00275	0.00419
	(0.0200)	(0.0233)	(0.0214)	(0.0196)	(0.0241)	(0.0214)	(0.0171)
cmoXasianmean	-0.0306	-0.0326	-0.0113	-0.0189	-0.0364	-0.0121	-0.0132
	(0.0276)	(0.0323)	(0.0296)	(0.0271)	(0.0333)	(0.0296)	(0.0236)
freelunch	-0.00407	-0.0127***	-0.00821**	-0.0124***	-0.00918**	-0.00849**	-0.00620**
	(0.00330)	(0.00435)	(0.00357)	(0.00326)	(0.00449)	(0.00357)	(0.00284)
cmoXfreelunch	-0.0103*	-0.00153	-0.00282	0.00232	0.00262	-0.00392	-0.00448
	(0.00622)	(0.00748)	(0.00664)	(0.00608)	(0.00771)	(0.00665)	(0.00530)
ell	-0.0182***	-0.0323***	-0.0205***	-0.0163***	-0.0276***	-0.00284	-0.00396
	(0.00528)	(0.00621)	(0.00569)	(0.00521)	(0.00640)	(0.00570)	(0.00454)
cmoXell	-0.00984	0.00677	-0.0167*	-0.0126	0.00296	-0.0172**	-0.00550
	(0.00803)	(0.00940)	(0.00856)	(0.00784)	(0.00969)	(0.00858)	(0.00683)
enroll	6.13e-05	4.02e-05	-3.00e-05	2.91e-05	8.16e-05	-2.94e-05	-6.56e-05
	(0.000104)	(0.000124)	(0.000111)	(0.000102)	(0.000127)	(0.000111)	(8.88e-05)
pupilteach	0.0225***	0.0162*	0.0259***	0.0250***	0.0144	0.0152**	0.0116*
	(0.00701)	(0.00851)	(0.00757)	(0.00693)	(0.00877)	(0.00758)	(0.00604)
yearround	-0.0519	0.208	0.151	0.0375	0.00783	0.101	-0.0415
	(0.139)	(0.163)	(0.149)	(0.137)	(0.168)	(0.150)	(0.119)
fep	0.0176***	0.0175***	0.0103***	0.00720**	0.0290***	0.00982***	0.00767***
	(0.00298)	(0.00364)	(0.00319)	(0.00292)	(0.00375)	(0.00319)	(0.00254)
refep	0.000782	0.000628	0.000817	0.000636	0.00120	0.00148	0.000318
	(0.000889)	(0.00104)	(0.000949)	(0.000869)	(0.00107)	(0.000951)	(0.000757)
year	0.0329	0.119*	-0.0110	0.0286	0.107*	0.128**	0.105**
	(0.0527)	(0.0615)	(0.0564)	(0.0516)	(0.0634)	(0.0565)	(0.0450)
Constant	-0.688**	0.366	0.353	0.440	-0.696	-1.254***	-1.191***
	(0.345)	(0.446)	(0.370)	(0.339)	(0.460)	(0.370)	(0.295)
Observations	226	225	224	224	225	224	224
R-squared	0.466	0.464	0.405	0.480	0.485	0.388	0.358

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1