CCSA's Technical Response to the Recent Publications of Dr. Vladimir Kogan

This document makes three technical points about Dr. Kogan's recent policy brief and related blog post. The first two are facts that Dr. Kogan neglects, and the third explains why his key finding is inaccurate.

1. **Value-add in is unavailable or incomplete for most Ohio schools.**
2. **The SSM and PI are similarly imperfect, but they are better together than PI alone.**
3. **The SSM disadvantages Ohio charter schools.**

*Note: The Similar Student Measure (**SSM**) is a measure of demographic-controlled achievement developed in California. The Performance Index (**PI**) is a measure of pure achievement calculated for schools in Ohio. Below, "achievement" refers to both of these.*

Before diving in, we feel compelled to mention three things. One, Dr. Kogan never reached out to us to make sure he had accurately replicated our SSM. We reached out to him after his policy brief and blog were published, and he subsequently produced two revised versions of his policy brief that also do not precisely replicate our model. Two, Dr. Kogan has sent us two different datasets: one containing 3,304 schools of which 2,143 have value-add, and then another containing 3,257 schools of which 2,565 have value-add. The results below are based on the first dataset, and the findings are similar in the second. Lastly, Dr. Kogan was unaware of what Ohio education data is publicly available. California researchers had to send him instructions on where to locate data on the number of students tested in each school.

1. **Value-add in is unavailable or incomplete for most Ohio schools.**

In written communication, Dr. Kogan states: *"Value-added is available only for certain grades because students are only tested in certain grades. Applying SSM to the data from these same grades does not somehow magically make the resulting measure valuable for evaluating the quality of education in the non-tested grades."*

It isn't magic. Dr. Kogan appears to have forgotten that 35% of Ohio's schools with achievement data – 1,161 of 3,304 – have no value-added scores. This is because while grades 3-8 and 11 have achievement data, only grade 4-8 have value-added data. For these 35% of schools, we can calculate the SSM.

Dr. Kogan also appears to have forgotten that only 15% of Ohio schools – the Middle and Jr. High schools – have value-added scores for every grade with achievement data. For the remaining 50% of schools, value-add provides an incomplete picture of the entire school because it does not reflect all tested grades. We test the importance of this incomplete picture by comparing the correlations between value-add and achievement across different school types. Table 1 shows that Middle and Jr. High schools have by far the highest correlations between value-add and achievement measures: 0.34 and 0.37. For Elementary and High schools, the correlations between value-add and achievement measures decrease as the number of grades with value-add decreases. When these schools only have one grade with value add, the correlations – 0.15 and 0.21 – are approximately half as strong as Middle and Jr. High schools. These patterns strongly suggest that value-add loses important information about a school when it is missing for a tested grade.

Table 1: Correlations between Value-Add and Achievement

Schools[i]	Correlation between Value-Add and SSM	Correlation between Value-Add and PI
Middle and Jr. High Schools, 1-3 grades have value-add (n=497), **0%** of tested grades lack value-add	0.34	0.37
Elementary and High Schools, 3 grades with value-add (n=432); **25%** of tested grades lack value-add	0.25	0.25
Elementary and High Schools, 2 grades with value-add (n=839); **33%** of tested grades lack value-add	0.22	0.24
Elementary and High Schools, 1 grade with value-add (n=339); **50%** of tested grades lack value-add	0.15	0.21

2. The SSM and PI are similarly imperfect, but they are better together than PI alone.

Where Dr. Kogan effectively demonstrates ways in which the SSM differs from value-add, he neglects to point out that analogous problems exist for the PI. The low correlation between value-add and the SSM (0.2) also exists between value-add and the PI (0.25). If Dr. Kogan is arguing that this lack of convergent validity justifies not using the SSM, then consistency would force him to also argue against using the PI.

Dr. Kogan also highlights the extent to which the five SSM categories differ from the five value-add categories. He does not mention how different the PI categories are. The values in the table below are calculated from the School Results table on Ohio's 2014 State report card. The percent of schools scoring A and B nearly flip between the two variables, and many more schools earn an F on value-add than on the PI.

Table 2: PI and Value-Add are divided into extremely different categories

	% A	% B	% C	% D	% F
Performance Index	8%	54%	21%	16%	2%
Value-Add	38%	11%	19%	8%	24%

However, this all ignores the underlying distributions. The table below reports skewness for value-add, SSM, and PI. The further this value is from 0, the less the distribution is normal. The distribution of value-add is much closer to the SSM than the PI. This suggests that SSM can differentiate among schools at least as well as the PI.

Table 3: Distribution characteristics for schools with value-added scores

	Skewness
Value-Add	0.2
Similar Students Measure (SSM)	-0.5
Performance Index (PI)	-1.3

CCSA believes that the SSM and PI are stronger together than separate. In a binary regression with the SSM and PI predicting value-add, both variables have positive coefficients. This means that if two schools have the same PI, the one with the higher SSM probably has a higher value-added score. Both the SSM and PI provide distinct pieces of information related to school quality. We do not understand why one would neglect the SSM, especially when value-add is incomplete or unavailable.

3. The SSM disadvantages charter schools.

The primary statistical disagreement we have with Dr. Kogan concerns whether or not we should apply weights to the regression in his Table 4. In written communication, Dr. Kogan states "*All of the tables [in my policy brief] are based on 'school-level results'.*" Exactly! Dr. Kogan could have applied weights to all his Tables, yet he did not. We agree that he should not because he is analyzing school-level distributions, not student-level ones.

Why does Dr. Kogan use weights only for his Table 4? His written response points to the dependent variables: "*schools [are] the level of analysis in both sets of models [i.e. SSM and Table 4]. The measure of performance we have and use for fitting SSM is the aggregate performance of all students in the school, not the performance of individual students.*"

However, the determining factor is the difference in independent variables, not the dependent one. The SSM uses tested students as weights because every independent variable in the model reflects students. We need weights in order to correctly measure the relationship between the demographic variables that reflect students and the performance index that reflects the school. In contrast, every independent variable in Table 4 reflects school types: elementary, charter, etc. We don't need any weights to correctly measure the relationship between school type variables that reflect schools and performance measures that also reflect schools. Given this, the table below is correct:

Corrected Table 4: Assessing Bias in SSM Indicators of School Quality
Dependent Variable: SSM Measure

Independent Variable	**Coefficient (Standard Error)**
Value-Added Gain Score	0.249*** (0.025)
Middle School	-0.469* (0.277)
Junior High School	-1.157* (0.600)
High School	0.313 (0.426)
Community (i.e. Charter) School Startup	-1.339** (0.552)
Community (i.e. Charter) School Conversion	-6.485*** (1.255)
"Big 8" Urban School	-2.128*** (0.358)
Constant	0.104

	(0.145)
Observations	2,143
R^2	0.080
Adjusted R^2	0.077

Note: *p<0.1; **p<0.05; ***p<0.01

Conversion charters have the largest negative coefficient of any school type. Dr. Kogan also finds this in his weighted regression, but he does not discuss that point. Startup charters have a significant negative coefficient, which is the exact opposite of Dr. Kogan's finding. Dr. Kogan uses his inaccurate finding to claim that charters tend to obtain students who enjoy unmeasured privileges, such as supportive parents. While research has found this in some contexts, this does not appear true in Ohio. To reflect the reality in Ohio, Dr. Kogan's example of a Traditional Public School and a Charter [Public] School needs to be changed.

Summary

The table below shows that charters serve mostly historically disadvantaged students nearly identical to those in the "Big 8" urban districts. Charters serve many historically disadvantaged students, and this responsibility should not be taken lightly. While value-add is ideal, it is incomplete or unavailable for most schools. The SSM and PI both are similarly imperfect, but they provide complementary pieces of information about school quality. We should use all available resources to ensure that charter schools uphold their promise: accountability in exchange for autonomy.

Table 5: Students Served by Groups of Ohio Schools

Demographic	Non-charters	Charters	"Big 8" Urban Schools
% with Disabilities	15%	20%	18%
% English Learners	3%	7%	8%
% Low-Income	50%	86%	86%
% African-American	12%	58%	57%
% Hispanic	4%	7%	6%

[i] The data provided by Dr. Kogan does not include charter grade spans. We include charters in rows 1 through 3 if they only have value-added scores for grades 4, 4 and 5, or 4 through 6, respectively. We could not tell whether the 36 other charters with value-add were middle or high schools, so they are excluded.