

CREDO Finale to Hoxby's Revised Memorandum

On October 9, 2009 Caroline Hoxby replaced her original Memo “A Serious Statistical Mistake in the CREDO Study of Charter Schools” with a new version, titled simply “A Statistical Mistake in the CREDO Study of Charter Schools”. The title page includes the statement, “This is a somewhat longer version of the August 2009 version of this memo. It adds additional equations to help readers follow the statistical proofs. A few other notes have also been added.”

Few readers will miss the fact that the “amplified” proof is markedly different from the original and reaches somewhat different conclusions. A different proof was needed given that the previous one was shown to be both mistaken and unfounded.¹ The new proof is also incorrect, though it comes closer to reflecting the approach that CREDO uses.

This memo demonstrates conclusively that the theoretical problem hypothesized by Dr. Hoxby does not exist in our data, thus settling this abstract issue with facts rather than speculation. Dr. Hoxby asserts that the Virtual Control Record must introduce bias into the estimation of the effect of charter schooling on student achievement due to larger measurement error in the prior achievement of charter school students. We demonstrate below that the means and variances of prior achievement are identical for charter students and control students in the VCRs. Appendix A provides the results of t-tests for differences in prior achievement (named z-state_t0) for the first-period records of charter school students and their VCR matches. The overall results are:

	Reading		Math	
	Mean	Standard Error	Mean	Standard Error
VCR Match	-.0327747	.0012930	-.0911137	.0012946
Charter School Students	-.0328184	.0012949	-.0914350	.0012969

In both math and reading, the distributions are symmetrical, and the t-tests provide no support for Dr. Hoxby’s fundamental premise. We also tested the distributions for each state independently and the results were the same. These results hold for both the unconditional distributions of prior achievement and for the distributions after conditioning on each of the additional explanatory variables in CREDO’s statistical analyses. In fact, the CREDO VCR method is a viable methodology for matching students that mitigates several of the concerns that Dr. Hoxby raises concerning the use of administrative datasets.

The CREDO analysis produces a valid picture of the distribution of charter school performance. While not as favorable to charter schools many would have liked (including CREDO), the results provide a basis for the necessary discussion regarding the causes of the observed variation in charter school quality and the pros and cons of the available policy options for improvement.

¹ CREDO. Fact vs. Fiction: An Analysis of Dr. Hoxby’s Misrepresentation of CREDO’s Research, October 7, 2009.

CREDO appreciates all efforts to substantively improve our analytical methods, but the methodological issues raised by Dr. Hoxby have been fully addressed and it is now time to return to substantive policy discussions.

APPENDIX A

Starting Score t-tests for Reading and Math

NOTE: The following t-tests are performed on the starting score (z_state_t0) for period 1 matched students, so this is the score on which the students were matched.

 OVERALL for read

Two-sample t test with equal variances

```
-----
-
  Group |      Obs      Mean   Std. Err.   Std. Dev.   [95% Conf.
Interval]
-----+-----
-
  TPS |  529170  -.0327747   .001293   .9405509   -.0353088   -.0302405
Charter |  529170  -.0328184   .0012949   .9419374   -.0353563   -.0302805
-----+-----
combined | 1058340  -.0327965   .0009149   .941244   -.0345898   -.0310033
-----+-----
-
  diff |           .0000437   .0018299           -.0035428   .0036302
-----
```

```
diff = mean(TPS) - mean(Charter)           t = 0.0239
Ho: diff = 0                               degrees of freedom = 1.1e+06

Ha: diff < 0                               Ha: diff != 0                               Ha: diff > 0
Pr(T < t) = 0.5095                         Pr(|T| > |t|) = 0.9809                         Pr(T > t) = 0.4905
```

 OVERALL for math

Two-sample t test with equal variances

```

-----
-
  Group |      Obs      Mean   Std. Err.   Std. Dev.   [95% Conf.
Interval]
-----+-----
-
  TPS   | 529177  -.0911137   .0012946   .9417248   -.093651   -.0885764
Charter | 529177  -.0914350   .0012969   .9434122   -.0939769   -.0888932
-----+-----
-combined | 1058354  -.0912744   .0009162   .9425684   -.0930701   -.0894786
-----+-----
-
  diff  |          .0003214   .0018324          -.0032702   .0039129
-----
-
diff = mean(TPS) - mean(Charter)          t = 0.1754
Ho: diff = 0          degrees of freedom = 1.1e+06

Ha: diff < 0          Ha: diff != 0          Ha: diff > 0
Pr(T < t) = 0.5696    Pr(|T| > |t|) = 0.8608    Pr(T > t) = 0.4304

```